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THE DIAMOND

A STUDY IN CHINESE AND HELLENISTIC FOLK-LORE

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INTRODUCTORY.— Of all the wonders and treasures of the Hellenistic-Roman Orient, it was the large variety of beautiful precious stones that created the most profound and lasting impression on the minds of the Chinese. During the time of their early antiquity the number of gems known to them was exceedingly limited, and mainly restricted to certain untransparent, colored stones fit for carving; while the transparent jewel with its qualities of lustre, cut, polished, and set ready for wearing, was a matter wholly unknown to them. Only contact with Hellenistic civilization and with India opened their eyes to this new world, and together with the new commodities a stream of Occidental folk-lore poured into the valleys of China. That a chapter from a series of discussions devoted to Chinese-Hellenistic relations[1] is taken up by a detailed study of the history of the diamond, is chiefly because this very subject affords a most instructive example of the diffusion of classical ideas to the Farthest East. The mind of the Chinese offered a complete blank in this respect, being unacquainted with the diamond, and was therefore easily susceptible to the reception of foreign notions along this line.[2] India was the distributing-centre of diamonds to western Asia, Hellas and Rome, on the one hand, and to south-eastern

[1] Two other contributions along this line have thus far been published: The Story of the Pinna and the Syrian Lamb (*Journal of American Folk-Lore*, Vol. XXVIII, 1915, pp. 103–128) and Asbestos and Salamander (*T'oung Pao*, 1915, pp. 297–371).

[2] GEERTS (Les produits de la nature japonaise et chinoise, p. 201) stated in 1878 that the diamond had not yet been found in China or Japan. Diamonds have been discovered in Shan-tung Province only during recent years (compare A. A. FAUVEL, Les diamants chinois, *Comptes-rendus Soc. de l'industrie minière*, 1899, pp. 271–281; Chinese Diamonds, *Mines and Minerals*, Vol. XXIII, 1902–03, p. 552). The late F. H. CHALFANT (in the work Shantung, the Sacred Province of China, ed. by FORSYTH, p. 346) gives this account: "Fifty-five *li* south-east of I-chou-fu lie the diamond fields. The stones are found on the low watershed between two streams, distributed through a very shallow soil over a reddish sandstone conglomerate. A determined effort was made by the same German company that operated the gold mine near I-chou, to develop the diamond field, but the enterprise was not a commercial success. It is the opinion of the German experts that the stones were deposited in their present position by the action of water at the time when, according to the theory, there was a connection between the two rivers. It is supposed that the source of the supply is somewhere in the mountains of Mêng-yin. Meanwhile, diamonds, some of them of very good quality, are constantly picked up at the locality described and occasionally at other points." The mines were abandoned by the

Asia and China on the other hand. Nevertheless the ideas conceived by the Chinese regarding the diamond do not coincide with those entertained in India, but harmonize with those which we find expounded in classical literature. This fact is due to the direct importation of diamonds from the Hellenistic Orient to China; but it has been entirely unknown heretofore, and this is another reason which will justify this investigation now made for the first time. Its significance lies not only in the field of Chinese research, but in that of classical archæology as well. The copious and reliable accounts of Chinese authors advance our knowledge of the subject to a considerable degree beyond the point where the classical writers leave us, and elucidate several problems as yet unsettled. It will be seen on the pages to follow that the use of the diamond-point in the ancient world, doubted or disowned by many scholars, now becomes a securely-established fact, and also that the acquaintance of the ancients with the true diamond rises from the sphere of sceptical speculation into a certain and permanent fact. Likewise the much-ventilated question as to whether the ancients employed diamond-dust, and cut and polished the diamond, will be presented in a new light.

LEGEND OF THE DIAMOND VALLEY.— The *Liang se kung ki*,[1] one of the most curious books of Chinese literature, contains the following account: "In the period T'ien-kien (502–520) of the Liang dynasty,

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Germans in 1907, as the diamonds proved to be of little value for gems, while answering well for industrial purposes (*Engineering and Mining Journal*, Vol. LXXXIV, 1907, p. 1159). An anonymous writer in *Mines and Minerals* (Vol. XXIII, 1903, p. 552) reports as follows on Chinese diamond-digging: "The Chinese procure the diamonds by the following method: After the summer rains which, according to them, produce diamonds on the surface of the soil, whence the uselessness of digging to find them, they walk back and forth over the sand of the torrents. The fragments of diamonds, on account of their sharp points and edges, penetrate the rye straw of their sabots to the exclusion of other gravel. When they think there is a sufficient quantity they make a pile of the sabots and burn them. The ashes are afterwards passed through a sieve to separate the diamonds. Those which we saw were small, varying from the size of a grain of millet to that of a hemp seed. They are generally of a light-yellow color like those of the Cape, though there are some perfectly white. When they find them of sufficient size they break them, as they told us, in order to make drill points, for, not knowing how to cut them, the Chinese in general do not consider them as precious stones. They prefer the jade, the amethyst, the carnelian, and the agate. Only the rich Chinese of the ports and of Peking have bought cut diamonds, imported from India or Europe, to ornament their hats or their rings, since the Dutch first brought them into China in the sixteenth century. The Shan-tung collectors sell them throughout China, and their trade is of considerable importance." The exact date of this modern diamond-digging is not known to me, but it seems not to be earlier than the latter part of the nineteenth century. I can find no reference to it in Chinese literature.

[1] Or *Liang se kung tse ki* (see BRETSCHNEIDER, Bot. Sin., pt. 1, No. 451), that is, Memoirs of the Four Worthies or Lords of the Liang Dynasty (502–556), who were

Prince Kie of Shu (Sze-ch'uan) paid a visit to the Emperor Wu,[1] and, in the course of conversations which he held with the Emperor's scholars on distant lands, told this story: 'In the west, arriving at the Mediterranean,[2] there is in the sea an island of two hundred square miles (*li*). On this island is a large forest abundant in trees with precious stones, and inhabited by over ten thousand families. These men show great ability in cleverly working gems,[3] which are named for the country Fu-lin 拂林. In a northwesterly direction from the island is a ravine hollowed out like a bowl, more than a thousand feet deep. They throw flesh into this valley. Birds take it up in their beaks, whereupon they drop the precious stones. The biggest of these have a weight of five catties.' There is a saying that this is the treasury of the Devarāja of the Rūpadhātu 色界天王."[4]

From several points of view this text is of fundamental importance. First of all, it contains the earliest mention in Chinese records of the country Fu-lin, antedating our previous knowledge of it by a century.

Huei-ch'uang, Wan-kie, Wei-t'uan, and Chang-ki; the work was written by Chang Yüe (667–730), a statesman, poet, and painter of the T'ang period. The text translated above is given in *T'u shu tsi ch'êng*, section on National Economy 321, chapter on Precious Commodities (*pao huo*); it is reprinted in the writer's Optical Lenses (*T'oung Pao*, 1915, p. 204).

[1] He was the first emperor of the Liang dynasty and bore the name Siao Yen; he lived from 464 to 549.

[2] Literally, "the Western Sea" (*Si hai*). Compare HIRTH, The Mystery of Fu-lin II (*Journal Am. Or. Soc.*, Vol. XXXIII, 1913, p. 195).

[3] Literally, "implements or vessels of precious stones" (*pao k'i*), among which also antique intaglios are presumably included.

[4] A Sanskrit-Buddhist term meaning "the Celestial King of the Region of Forms." Region of Forms is the second of the three Brahmanic worlds (*trailokya*). The detailed discussion of this subject on the part of O. FRANKE (Chinesische Tempelinschrift, *Abhandl. preuss. Akad.*, 1907, pp. 47–50) is especially worth reading. There are four Celestial or Great Kings guarding the four quarters of the world, each posted on a side of the world-mountain Sumeru. The one here in question is Kubera or Vaiçravaṇa, the regent of the north and God of Wealth, the ruler of the aerial demons, called Yaksha. In earlier Buddhist art he is represented as standing on a Yaksha (see the writer's Chinese Clay Figures, pp. 297 *et seq.*); in later art he is figured holding in his right hand a standard and in his left an ichneumon (*nakula*) spitting jewels (compare A. FOUCHER, *Bull. de l'Ecole française*, Vol. III, p. 655). This animal is known as the inveterate enemy of snakes; and snakes, in Indian belief, are the guardians of precious stones and other treasures. By devouring the snakes, the ichneumon (or, to use its Anglo-Indian name, mangoose) appropriates their jewels, and has hence developed into the attribute of Kubera. The reference to the Indian God of Wealth in the above text is, of course, not an element inherent in the story, as it was transmitted from Fu-lin, but an interpolation of the Chinese author prompted by a reflection regarding a tradition hailing from India. This Indian story has been recorded by him in another passage of the same work, and will be discussed farther on (p. 18).

Professor HIRTH, a lifetime student of the complex Fu-lin problem,[1] encountered the first notices of Fu-lin in the Annals of the T'ang Dynasty, and an incidental reference to it in the Annals of the Sui Dynasty, written between 629 and 636, thus tracing the first appearance of the name to the first half of the seventh century. CHAVANNES[2] called attention to a text written in 607, in which Fu-lin is mentioned, with reference to a passage translated by him from the *Ts'e fu yüan kuei*, where the name is written in the same manner as in our text above.[3] The latter distinctly relates to the period T'ien-kien (502–520), and, further, is chronologically determined through the mention of the Liang Emperor Wu. Accordingly we are here confronted with the earliest allusion to the country Fu-lin in the beginning of the sixth century. The fact that the well-known Fu-lin discussed by Hirth and Chavannes, and no other, is involved in this passage, is evidenced by the very contents of the text, which, as will be demonstrated presently, harbors a tradition emanating from the Hellenistic Orient. It is notable that our text writes the second element of the name 林 instead of 菻, as the later documents do; it is obvious that a popular interpretation is intended here, the "forest" (*lin*) of the jewels being read into *Fu-lin:* as if it were "forest of Fu." This is not the place to revive the much-ventilated question of the etymology of this name, or to take sides with the interpretations proposed by HIRTH and CHAVANNES;[4] but brief reference should be made to the recent theory of PELLIOT,[5] according to whom the word *Fu-lin* is the product of the name *Rōm*, prompted by a supposed intermediary form *Frōm*, which issued from Armenian *Hrom* or *Horom* and Pahlavī *Hrōm*. Pelliot thinks also that the name *Fu-lin* appears in China with certainty around 550, and that it is possibly still older, which perfectly harmonizes with the result obtained from the above text.

The story about the capture of the precious stones is almost enigmatical in its terse brevity, but it at once becomes intelligible if we recognize it as an abridged form of a well-known Western legend. The oldest hitherto accessible version of it is contained in the writings of

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[1] In his book China and the Roman Orient, and in his studies The Mystery of Fu-lin (*Journal Am. Or. Soc.*, Vol. XXX, 1909, pp. 1–31; Vol. XXXIII, 1913, pp. 195–208).

[2] *T'oung Pao*, 1904, p. 38.

[3] The same mode of writing occurs in *Yu yang tsa tsu* and in a poem of the T'ang Emperor T'ai-tsung (see *P'ei wen yün fu*, Ch. 27, p. 25).

[4] The latter has developed the conflicting views of both sides in *T'oung Pao*, 1913, p. 798.

[5] *Journal asiatique* (Mars-Avril, 1914), p. 498.

EPIPHANIUS, Bishop of Constantia in Cyprus (*circa* 315–403).[1] In his discourse on the twelve jewels forming the breastplate of the High Priest of Jerusalem, the following tale is narrated of the hyacinth. The theatre of action is a deep valley in a desert of great Scythia, entirely surrounded by rocky mountains rising straight like walls; so that from their summits the bottom of the valley is not visible, but only a sullen mist like chaos. The men despatched there in search of those stones by the kings, who reside in the neighborhood, slay sheep, strip them of their skins, and fling them from the rocks into the immense chaos of the valley. The stones then adhere to the flesh of the sheep. The eagles that loiter on the cliffs above scent the flesh, pounce down upon it in the valley, carry the carcasses off to devour them, and thus the stones remain on the top of the mountains. The convicts condemned to gather the stones go to the spots where the flesh of the sheep has been carried away by the eagles, find and take the stones. All these stones, whatever the diversity of their color, are of value as precious stones, but have this effect: that, when placed over a violent charcoal fire, they themselves are but slightly hurt, while the coal is instantly extinguished. This stone is reputed to be useful to women in aiding parturition; it is said also to dispel phantoms in a similar manner.[2]

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[1] Epiphanii opera, ed. DINDORF, Vol. IV, p. 190 (Leipzig, 1862). The text in question is reproduced also by J. RUSKA (Steinbuch des Aristoteles, p. 15).

[2] The notion that the stones gathered by eagles aid in parturition rests on the belief of the ancients that the so-called *aëtites* or "eagle-stone," found in the nests of eagles, possesses remarkable properties having this effect. According to PLINY (X, 3, § 12; and XXXVI, 21, § 151), who distinguishes four varieties, this stone, so to speak, has the quality of being pregnant; for when shaken, another stone is heard to rattle within, as though it were enclosed in its womb. A male and a female stone are always found together; and without them, the eagles would be unable to propagate. Hence the young of the eagle are never more than two in number. PHILOSTRATUS, in his Life of Apollonius from Tyana, notes that the eagles never build their nests without first placing there an eagle-stone (F. DE MÉLY, Lapidaires grecs, p. 27). This stone is regarded as ferruginous geodes, a globular mass of clay iron-stone, which sometimes is hollow, sometimes encloses another stone or a little water. According to the Physiologus (XIX), the parturition-stone is found in India, whither the female vulture repairs to obtain it. From the Physiologus the story passed into the Arabic writers (J. RUSKA, Steinbuch des Aristoteles, p. 165; Steinbuch des Qazwīnī, pp. 18, 38; L. LECLERC, Traité des simples, Vol. I, pp. 121–123). O. KELLER (Tiere des classischen Altertums, p. 269) regards the legend of the eagle-stone as Egyptian, because it is mentioned by Horapollo (II, 49); but his work Hieroglyphica belongs to the fourth century A.D., while even THEOPHRASTUS (De lapidibus, 5) speaks of parturient stones. It seems more plausible that, as intimated by the Physiologus, the story hails from India. The physician Rāzi, who died in 923 or 932, observes (LECLERC, *l. c.*) that he encountered in some books of India the statement that a woman is easily delivered when the stone is placed on her abdomen. Regarding similar notions in China compare F. DE MÉLY, L'alchimie chez les Chinois (*Journal asiatique*, 1895, Sept.-Oct., p. 336) and Lapidaires chinois, p. LXIII.

The coincidence of this tale with our Chinese text is striking, the chief points — the deep valley, the flesh thrown down as bait, the birds bringing up the stones with it — being identical. The coincidence is the more remarkable, as the subsequent additional features with which the legend has been embellished in the West are lacking in the Chinese version. For this reason the conclusion is justified that the latter, directly traceable to a version of the type of Epiphanius, was transmitted straightway to China, as revealed by the very words of the Chinese account, from Fu-lin, a part of the Roman Empire.

In the second oldest Western version we encounter two new elements,— Alexander the Great and snakes guarding the stones. The oldest Arabic work on mineralogy, wrongly connected with the name of Aristotle and composed before the middle of the ninth century, has the following under the "diamond:"[1] "Nobody but my disciple Alexander reached the valley in which diamonds are found. It lies in the east along the extreme frontier of Khorasan, and its bottom cannot be penetrated by human eyes.[2] Alexander, after having advanced thus far, was prevented from proceeding by a host of snakes. In this valley are found snakes which by gazing at a man cause his death. He therefore caused mirrors to be made for them; and when they thus beheld themselves, they perished, while Alexander's men could look at them.[3] Thereupon Alexander contrived another ruse: he had sheep slaughtered, skinned, and flung on the bottom of the valley. The diamonds adhered to the flesh. The birds of prey seized them and brought part of them up. The soldiers pursued the birds and took whatever of their spoils they dropped." This account might lead us to suspect that the legend may have formed part of the Romance of Alexander, the archetype of which is preserved in the book known as that of Pseudo-Callisthenes, and produced at Alexandria in Egypt in the second century A.D.[4] In fact, however, it does not appear there, nor in any of the other early Western or Oriental cycles of the Alexander legends. The first Alexander legend in which it was incorporated is

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[1] J. RUSKA, Steinbuch des Aristoteles, p. 150.

[2] Almost identical with the phraseology of Epiphanius: "Ita ut signis desuper, a summitatibus montium tanquam de muris aspiciat solum convallis, pervidere non possit."

[3] A reminiscence of the basilisk, that hideous serpent-like monster described by Pliny (VIII, 33). The mediæval poets have the basilisk die when it beholds itself in a mirror (F. LAUCHERT, Geschichte des Physiologus, p. 186).

[4] According to current opinion. A. AUSFELD (Der griechische Alexanderroman, p. 242, Leipzig, 1907), however, in his fundamental investigation of the Greek work, dates the oldest recension of Pseudo-Callisthenes with great probability in the second century B.C.

the *Iskander-nāmeh* of the Persian poet Nizāmī (1141–1203);[1] here we likewise meet the snakes, and it is now clear that Aristotle's *lapidarium* was the source of Nizāmī's episode.[2] It is well known that in the Arabic stories of Sindbad the Sailor, Sindbad, deposited by the Rokh in the Diamond Valley, observes how merchants throw down flesh, which is carried upward by vultures (also Nizāmī speaks of vultures) together with the diamonds sticking to it; enveloped by this flesh, he is lifted in the same manner.[3] The gradual growth of the legend from the simple form in which Epiphanius had clothed it is interesting to follow. In the celebrated Arabic "Book of the Wonders of India,"[4] written about A.D. 960, our legend is told by a traveller who had penetrated into the countries of India, and who localized it in Kashmir. He introduces a new element,— a fire constantly burning in the valley day and night,

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[1] J. RUSKA, Steinbuch des Aristoteles, p. 14.

[2] Qazwīnī (1203–83) has the same story somewhat more amplified (J. RUSKA, Steinbuch aus der Kosmographie des al-Qazwīnī, p. 35); but it is interesting that he communicates two versions of it,— one being a close adaptation of Aristotle's account, the other staged on Serendīb (Ceylon) [where diamonds are not found] and not connected with the name of Alexander. It is obvious that the Arabic polyhistor, in his notice of the diamond, is reproducing two different sources,— the first being introduced by the words "Aristotle says;" the second, by the words "Another says." It is clear also that in this anonymous version the snakes are a purely incidental accessory which was lacking in the original text. "The mines are located in the mountains of Serendīb, in a valley of great depth, in which there are deadly snakes." The snakes, however, are put out of commission in the capture of the diamonds, which is due to the action of the vultures; and in order to justify the introduction of the reptiles, it is added at the end that large stones have to remain in the valley, as it cannot be reached for fear of the snakes. This observation is not without value for tracing the origin and growth of the legend. It shows that the feature of the snakes, however tempting this suggestion of its Indian origin may be to a superficial judgment, was not conceived in India, but in the Arabic-Persian sphere of the Alexander legends, with the evident object of aggrandizing the exploits of the conqueror. Qazwīnī's duplicity of versions is mirrored by MARCO POLO (ed. of YULE and CORDIER, Vol. II, pp. 360–361), who likewise offers two variants,— one with serpents, and another without them. The dependence of Qazwīnī's story on that in Aristotle's *lapidarium* has already been recognized by E. ROHDE (Der griechische Roman, p. 193, note, 3d ed., Leipzig, 1914). Ruska is right in his conclusion that the traditions concerning stones are relatively independent, and particularly so from the Alexander cycle; many a story in its origin had no connection with Alexander, but was subsequently associated with him in the same manner as King Solomon became the centre of numerous legendary fabrics. This follows in particular from the thorough investigation of A. AUSFELD (Der griechische Alexanderroman), who devoted a lifetime of study to the Greek romance of Alexander, and in whose purified text, representing the oldest accessible version, these mineralogical fables do not appear.

[3] Compare also BENJAMIN OF TUDELA, p. 82 (ed. of GRÜNHUT and ADLER, Jerusalem, 1903).

[4] P. A. VAN DER LITH and L. M. DEVIC, Livre des merveilles de l'Inde, p. 128 (Leiden, 1883–86); or L. M. DEVIC, Les merveilles de l'Inde, p. 109 (Paris, 1878).

summer and winter. The serpents are distributed around the fire; sheep's flesh, eagles, and capture of the stones, are the same features as previously mentioned, but the dangers of the work are magnified: the flesh may be devoured by the flames; the eagle, drawing too near the fire, may likewise be burnt; and the captors may perish from the peril of the fire and the serpents.[1]

In the Sung period (960–1278) the story was vaguely known to Chou Mi.[2] In his work *Ts'i tung ye yü*, as quoted by Li Shi-chên, he says that, according to oral accounts, diamonds come from the Western Countries (*Si yü*) and the Uigurs; that the stones stick to the food taken by eagles on the summits of high mountains, thus enter their bowels, and appear in their droppings, which are searched by men for the stones in the desert of Gobi, north of the Yellow River. The honest author adds, "I do not know whether it is so or not." Fang I-chi, the author of the *Wu li siao shi*,[3] who wrote in the first half of the seventeenth century, criticises Chou Mi's story as erroneous and not

[1] An echo of a certain motive of the legend of the Diamond Valley seems to reverberate in the Shamir legend of the Semitic peoples. The most interesting form of this legend is found in Qazwīnī (RUSKA, Steinbuch aus der Kosmographie, p. 16), who calls the stone *sāmūr* and characterizes it as the stone cutting all other stones. Solomon endeavors to obtain it that the stones required for the temple might be cut noiselessly. Only the eagle knows the place to find it, but the secret must be elicited from the bird through a ruse. The eggs are removed from its nest, enclosed in a glass bottle, and restored to their place. The returning eagle cannot break the glass with its pinions, and seeks for a piece of the stone in question, which he throws toward the vessel, breaking it into halves without noise. The eagle replies to Solomon's query that the stone is brought from a mountain in the west, termed Mount Sāmūr, whither Solomon sends the Djinns, who get a goodly supply for him. In this legend the stone *sāmūr* doubtless is intended for the diamond, and the motive of the eagle knowing its whereabouts is the same as in the legend of the Diamond Valley. The Talmud has strangely disfigured this story which is very sensibly told by Qazwīnī, and has transformed the stone *shamir* into a worm of the size of a barley-grain, capable of splitting and engraving the hardest objects, so that the *shamir* figures among the fabulous animals of the Talmud (L. LEWYSOHN, Zoologie des Talmud, p. 351). The worm (and simultaneously) diamond *shamir* has been entrusted to the wood-cock who took it to the summit of an uninhabited mountain; this is analogous to the birds or eagles bringing the diamonds up from the snake valley, and it is very tempting to assume that the snakes may have given rise to the curious Talmudic conception of the diamond as a worm. Lewysohn is of the opinion that the word *shamir* conveys the notion of hardness, and, for example, denotes iron, which is harder than stone, and also the diamond.— The Hebrew word *shamir* appears in Jeremiah (XVII, 1), Ezekiel (III, 9), and Zechariah (VII, 12), and is supposed to refer to the diamond ("adamant stone" in the English Bible); more probably it is the emery. In the opinion of some scholars, Greek σμύρις ("emery") is derived from the Hebrew word. For further bibliographical data on the Shamir legend see T. ZACHARIAE, *Zeitschr. Vereins für Volkskunde*, Vol. XXIV, 1914, p. 423.

[2] A celebrated and fertile author, who was born about 1230, and died before 1320 (see PELLIOT, *T'oung Pao*, 1913, pp. 367, 368).

[3] Ch. 8, p. 22 (edition of *Ning tsing t'ang*, 1884).

clear. Both authors were evidently not acquainted with the older version of the *Liang se kung ki*.

A new impetus to the legend was given during the Mongol period in the thirteenth century, when it was revived among the Arabs, in China, and in Europe. Reference has already been made to Qazwīnī (1203–83), who attributes it to the Valley of the Moon among the mountains of Serendīb (Ceylon); and the geographer Edrīsī localizes it in the land of the Kīrkhīr (probably Kirghiz) in Upper Asia. The Arabic mineralogist Ahmed Tīfāshī, who died in 1253, even gives two versions,— one referring to the hyacinth (in agreement with Epiphanius) of Ceylon, the other to the diamonds of India.[1] The former is vividly told, and the serpents "able to swallow an entire man" have duly been introduced; the latter is briefly jotted down, with a reference to the former chapter.

Ch'ang Tê, the Chinese envoy who was sent in 1259 to Hulagu, King of Persia, mentions in his diary, among the wonders of the Western countries, the diamond, of which he correctly says that it comes from India. "The people take flesh," his story goes, "and throw it into the great valley. Then birds come and eat this flesh, after which diamonds are found in their excrement."[2] It is obvious that Ch'ang Tê recorded the legend as

[1] A. RAINERI BISCIA, Fior di pensieri sulle pietre preziose di Ahmed Teifascite, pp. 21, 54 (2d ed., Bologna, 1906). As this work may not be in the hands of every reader, the text of the longer version may here be given: "Narra Ahmed Teifascite, a cui il sommo Iddio usi misericordia, che in alcuni anni non piovendo punto in quel montuoso territorio de Rahun, ed i suoi torrenti non trasportando per conseguenza verun lapillo di giacinto, coloro i quali bramano nulladimeno di farne acquisto, ricorrono al seguente compenso. Siccome sulla cima del prefato monte trovansi, ed annidano molte aquile, stante la total mancanza di abitatori, così prendono quelli un grosso animale, lo scannano, lo scorticano, e dopo averlo tagliato e diviso in larghi pezzi li lasciano alle falde dello stesso monte, e se n'allontanano. Osservando quelle aquile siffatti pezzi di carne corrono tosto per rapirli, e li trasportano verso dei loro nidi; ma giacchè cammin facendo sono costrette di posarli qualche volta in terra, n'accade perciò che attacansi a cotesti pezzi di carne diverse pietruzze o lapilli di giacinto. In seguito ripigliando le aquile stesse il volo coi rispettivi pezzi di carne, e venendo tra loro a contesa per rapporto ai medesimi, si dà la combinazione che nella mischia ne cadono alcuni fuori dal predetto monte; lo che veduto dalle persone ivi a bella posta concorse vanno subito a raccogliere da tali pezzi tutta quella copia di giacinto, che vi è rimasta attaccata. La parte inferiore dell'indicato monte è ingombrata da folti boschi, da larghi e profondi fossi, e burroni, non che da alberi d'alto fusto, ove trovansi vari serpenti che inghiottiscono un uomo intero. Per tal cagione niuno può salir su quel monte e vedere le maraviglie che in esso contengonsi."

[2] BRETSCHNEIDER, Mediæval Researches, Vol. I, p. 152. Bretschneider states that the legend is very ancient, but refers only to Sindbad the Sailor from a second-hand source, and to Marco Polo. The text of the passage will be found in G. SCHLEGEL (Nederlandsch-chineesch Woordenboek, Vol. I, p. 860). Compare MARCO POLO (ed. of YULE and CORDIER, Vol. II, p. 361): "The people go to the nests of those white eagles, of which there are many, and in their droppings they find plenty of diamonds which the birds have swallowed in devouring the meat that was cast into the valleys."

heard by him in the West, and that his version does not depend upon the older one of the *Liang se kung ki*, which evidently was not known to him. This case is interesting, for it shows that the same Western story was handed on to the Chinese at different times and from different sources.

About the same time, MARCO POLO chronicled the diamond story[1] which he learned in India, and its close agreement in the main points with the Arabic authors is amazing. The Venetian was not the first European, however, to record it; as pointed out by Yule, it is one of the many stories in the scrap-book of the Byzantine historian Tzetzes.[2]

Nicolo Conti of the fifteenth century relates it of a mountain called Albenigaras, fifteen days' journey in a northerly direction from Vijayanagar; and it is told again, apparently after Conti, by Julius Cæsar Scaliger. As a popular tale it is found not only in Armenia,[3] as stated by Yule, but also in Russia.[4]

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[1] YULE and CORDIER, The Book of Ser Marco Polo, Vol. II, p. 360. The bewitching of the serpents by means of mirrors is wanting. The feature of the eagles feeding upon the serpents appears to be a thoroughly Indian notion, absent in the Arabic accounts.

[2] One of the earliest mediæval sources that contains the story is the fantastic description of India and the country of Prester John, written by Elysæus in the latter part of the twelfth century, and edited by F. ZARNCKE (Der Priester Johannes II, pp. 120–127). This text is as follows: "Quomodo autem carbunculi reperiantur audiamus. Ibi est vallis quaedam, in qua carbunculi reperiuntur. Nullus autem hominum accedere potest prae pavore griffonum et profunditate vallis. Et cum habere volunt lapides, occidunt pecora et accipiunt cadavera, et in nocte accedunt ad summitatem vallis et deiciunt ea in vallem, et sic inprimuntur lapides in cadavera, et acuti sunt. Veniunt autem grifones et assumunt cadavera et educunt ea. Eductis ergo cadaveribus perduntur carbunculi, et sic inveniuntur in campis."

[3] Probably due to the fact that it was adopted by the Armenian *lapidarium* of the seventeenth century, translated into Russian by K. P. PATKANOV (p. 3). Of especial interest is the fact that the snakes are dissociated from the two Armenian versions known to us. This is the more curious, as the *lapidarium* fastens the story upon Alexander: consequently some Oriental form of the Romance of Alexander must have pre-existed, in which the snakes did not yet figure. For the benefit of those who may not have access to VON HAXTHAUSEN'S Transcaucasia (London, 1854), the source of the Armenian popular story (p. 360), its text may here follow: "In Hindostan there is a deep and rocky valley, in which all kinds of precious stones, of incalculable value, lie scattered upon the ground; when the sun shines upon them, they glisten like a sea of glowing, many-colored fire. The people see this from the summits of the surrounding hills, but no one can enter the valley, partly because there is no path to it and they could only be let down the steep rocks, and partly because the heat is so great that no one could endure it for a minute. Merchants come hither from foreign countries; they take an ox and hew it in pieces, which they fix upon long poles, and cast into the valley of gems. Then huge birds of prey hover around, descend into the valley, and carry off the pieces of flesh. But the merchants observe closely the direction in which the birds fly, and the places where they alight to feed, and there they frequently find the most valuable gems."

[4] AZBUKOVNIK, Tales of the Russian People (in Russian), Vol. II, p. 161. As the story is here told in regard to the hyacinth, it appears to go back directly to the account of Epiphanius.

Under the Ming (1368–1643) the story was repeated by Ts'ao Chao in his work *Ko ku yao lun*, which he published in 1387. His version is as follows: "Diamond-sand comes from Tibet (*Si-fan*). On the high summits of mountains with deep valleys, unapproachable to men, they make perches for the eagles, on which they set out food. The birds eat the flesh on the mountains and drop their ordure into desert places. This is gathered, and the stones are found in it."[1]

As regards the origin of our legend, two distinct opinions have been voiced. YULE[2] and ROHDE[3] point to its great resemblance to what Herodotus (III, 111) tells of the manner in which cinnamon was obtained by the Arabs; and a certain amount of affinity between the two cannot be denied. Great birds, says Herodotus, make use of cinnamon-sticks to build their nests, fastened with mud to high rocks, up which no foot of man is able to climb. So the Arabians resort to the artifice of cutting up the carcasses of beasts of burden and placing the pieces near the nests, whereupon they withdraw to a distance; and the old birds, swooping down, seize the flesh and bring it up into their nests. As the pieces are large, they break through the nest and fall to the ground, when the Arabians return and collect the cinnamon. The interval between Herodotus and Epiphanius is too great to be spanned or to allow us to link their stories in close historical bonds. There must be many intermediary links unknown to us. They evidently belong, as two individual variations, to the same type of legend, and seem to point to the fact that the latter existed in the near Orient for a long time.[4] The Chinese text recorded in the beginning of the sixth century, from which we started, furnishes additional testimony to this effect.

V. BALL[5] is inclined to think that the story "appears to be founded on the very common practice in India, on the opening of a mine, of offering up cattle to propitiate the evil spirits who are supposed to guard treasures — these being represented by the serpents in the myth. At such sacrifices in India, birds of prey invariably assemble to pick up

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[1] *Ko chi king yüan*, Ch. 33, p. 3b.

[2] *L. c.*, p. 363.

[3] Der griechische Roman, p. 193.

[4] Certain elements of the story may be found also in PLINY'S (XXXVII, 33) curious legend of the stone *callaina*, which has wrongly been identified with the turquois: Some say that these stones are found in Arabia in the nests of the birds called "blackheads" (Sunt qui in Arabia inveniri eas dicant in nidis avium, quas melancoryphos vocant). Pliny then reports the occurrence of the stones on inaccessible rocks which people cannot climb, and mentions the danger connected with the venture of seeking them. Capturing them with slings certainly is a different feature, characteristic of another cycle of legends.

[5] Translation of Tavernier's Travels in India, Vol. II, p. 461.

what they can, and in that fact we probably have the remainder of the foundation of the story. It is probable also that the story by Pliny and other early writers, of the diamond being softened by the blood of a he-goat, had its origin in such sacrifices."[1] This subjective explana-

[1] This tradition, which, as will be seen below, has a curious parallel in China, is entirely independent of the Diamond-Valley story, and bears no relation to it. It is regrettable that Ball does not betray who the "other early writers" are. Pliny, in fact, is the earliest and only ancient writer to have it on record; Augustinus (fifth century), Isidorus (who died in 636) and Marbod (1035–1123) have merely reiterated it after Pliny, and Pliny's story certainly is not borrowed from India. W. CROOKE (Things Indian, p. 135) is inclined to think that if Ball's explanation be correct, the early diamond-diggers must have been non-Aryans, who did not regard the cow as sacred. The "early diamond-diggers" are a bit of exaggeration: in no Indian record of very early date does any mention of the diamond occur. Crooke's information on this point lacks somewhat the necessary precision. According to him, "diamonds were from very early times valued in India. The Purāṇas speak of them as divided into castes, and Marco Polo describes them as found in the kingdom of Mutfili." The Purāṇa were at the best composed in the first centuries A.D., and more probably much later. The knowledge of the diamond, certainly, does not go back in India into that unfathomable antiquity, as pretended by some mineralogical and other authors (for instance, G. WATT, Dictionary of Economic Products of India, Vol. III, p. 93). It was wholly unknown in the Vedic period, from which no specific names of precious stones are handed down at all. The word *maṇi*, which has sometimes been taken to mean the diamond (MACDONELL and KEITH, Vedic Index of Names and Subjects, Vol. II, p. 119), simply denotes a bead used for personal ornamentation and as an amulet, and the arbitrary notion that it might refer to the diamond is disproved by the fact that it could be strung on a thread. The word *vajra*, which at a subsequent period became an attribute of the diamond, originally served for the designation of a club-shaped weapon and of Indra's thunderbolt in particular (MACDONELL, Vedic Mythology, p. 55). Philological considerations show us that the diamond had no place in times of Indian antiquity, for no plain and specific word has been appropriated for it in any ancient Indian language. Either, as in the case of *vajra*, a word long familiar with another meaning was transferred to it, or epithets briefly indicating some characteristic feature of the stone were created. S. K. AIYANGAR (Note upon Diamonds in South India, *Quarterly Journal of the Mythic Society*, Vol. III, p. 129, Madras, 1914) calls attention to the fact that the first systematic reference to diamonds is made in the Arthaçāstra of Kauṭilya (see V. A. SMITH, Early History of India, 3d ed., pp. 151–153). He mentions six kinds of diamonds classified according to their mines, and described as differing in lustre and degree of hardness. He points out those of regular crystalline form and those of irregular shape. The best diamond should be large, heavy, capable of bearing blows, regular in shape, able to scratch the surface of metal vessels, refractive and brilliant. Aiyangar dates the work in question "probably at the commencement of the third century B.C." This date, however, is a mooted point (compare L. FINOT, *Bull. de l'Ecole française*, Vol. XII, 1912, pp. 1–4), which it would be out of place to discuss here. More probably, it is in the early Pāli scriptures of Buddhism that we can trace the first unmistakable references to the diamond. In the Questions of King Milinda (*Milindapañha*, translation of RHYS DAVIDS, p. 128) we read that the diamond ought to have three qualities: it should be pure throughout; it cannot be alloyed with another substance; and it is mounted together with the most costly gems. The first alludes metaphorically to the monk's purity in his means of livelihood; the second, to his keeping aloof from the company of the wicked; the third, to his association with men of highest excellence, with men who have entered the first or second or third stage of

tion is hardly convincing. It presupposes that the legend originated in India, but this postulate is not proved. That the later Arabic authors and Marco Polo place the locality in India, means nothing. Epiphanius lays the plot in Scythia; the Chinese version is laid in Fu-lin, and that

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the Noble Path, with the jewel treasures of the Arhats. The Milindapañha may be dated with a fair degree of certainty: Milinda, who holds conversations with a Buddhist sage, is the Greek King Menandros, who ruled approximately between 125 and 95 B.C. in the north-west of India; and the dialogues attributed to him may have been composed in the beginning of our era (M. WINTERNITZ, Geschichte der indischen Litteratur, Vol. II, p. 140; V. A. SMITH, Early History of India, p. 225). It is therefore quite sufficient to believe that the diamond became known in India during the Buddhist epoch in the first centuries B.C., say, roughly, from the sixth to the fourth century. The precious stones mentioned in Milindapañha are enumerated by L. FINOT (Lapidaires indiens, p. XIX). The earliest descriptions of the diamond on the part of the Indians are by Varāhamihira (A.D. 505–587; see H. KERN, Verspreide Geschriften, Vol. II, p. 97) and by Buddhabhaṭṭa, who wrote prior to the sixth century A.D. Since the word *vajra* designates both Indra's thunderbolt and the diamond, it is in many cases difficult to decide which of the two is meant (A. FOUCHER, Etudes sur l'iconographie bouddhique de l'Inde, Vol. II, p. 15, left the point undecided, rendering *vajrāsana* by "siège de diamant ou du foudre"); and the same obstacle turns up again in Chinese-Buddhist literature, where the term *kin-kang* as the translation of Sanskrit *vajra* covers the two notions; so that, for instance, PELLIOT (*Bull. de l'Ecole française*, Vol. II, p. 146) raises the question, "Quel est le sens précis de *kin-kang*?" Whether the title of the Sūtra *Vajracchedikā*, for instance, is correctly translated by "diamond-cutter," as has been done, is much open to doubt. If it should mean "sharply cutting, like a diamond" (WINTERNITZ, *l. c.*, p. 249), why could it not mean as well "sharply cutting, like a thunderbolt"? The thunderbolt, generally described as metallic, is also sharp; and Indra whets it like a knife, or as a bull its horns. Though a Chinese commentator of that work observes that, as the diamond excels all other precious gems in brilliance and indestructibility, so also the wisdom of this work transcends and shall outlive all other knowledge known to philosophy (W. GEMMELL, The Diamond Sutra, p. 47), it is but a late afterthought, and proves nothing as to the original Indian concept. The most curious misconceptions have arisen about the so-called "Diamond-Seat" (*Vajrāsana*). This is the name of the throne or seat on which Çākyamuni, the founder of Buddhism, reached perfect enlightenment under the sacred fig-tree at Gayā. The Chinese pilgrim Hūan Tsang, who visited the place during his memorable journey in India, remarks that it was made from diamond (*Ta T'ang si yü ki*, Ch. 8, p. 14, ed. of *Shou shan ko ts'ung shu;* JULIEN, Mémoires sur les contrées occidentales, Vol. I, p. 460; WATTERS, On Yuan Chwang's Travels, Vol. II, p. 114); but this is incredible, if for no other reason, because he proceeds to say that this throne measured over a hundred paces in circuit. While this may be solely the outcome of a popular tradition growing out of an interpretation of the name, Hūan Tsang himself explains well how this name arose. It is derived, according to him, from the circumstance that here the thousand Buddhas of this eon (*kalpa*) enter the *vajrasamādhi* ("diamond ecstasy"), the designation for a certain degree of contemplative ecstasy. Moreover, in the Biography of Hūan Tsang (JULIEN, Histoire de la vie de Hiouen-Thsang, p. 139) it is more explicitly stated that the employment of the word "diamond" in the term "Diamond-Seat" signifies that this throne is firm, solid, indestructible, and capable of resisting all shocks of the world. In other words, it is used metaphorically; Buddha's own firmness and determination in the long struggle for obtaining enlightenment and salvation, his fortitude in overcoming the hostile forces of Māra, the Evil One, being transferred to the seat which he occupied immovably during

of Pseudo-Aristotle in Khorasan, etc. No ancient Sanskrit or Pāli version of the story has as yet become known; and the weight of evidence is in favor of the Arabs having propagated it farther eastward in the ninth and tenth centuries, while it was known in China long before that time. The snakes and eagles, of course, could be translated into Indian thought as Nāga and Garuḍa;[1] but, again, the Indians do not tell us of such a tradition in connection with these two mythical creatures. Even granted that the addition of the snakes in Pseudo-Aristotle might be due to a secondary influence or to some latent undercurrent of Indian conception which possibly penetrated into Syria, the Indian origin of the legend would not be proved, either: for Epiphanius has no snakes; and the old Chinese version lacks them too, and has "birds" instead of eagles. We remember, however, that the Chinese text winds up with an allusion to a Buddhist notion, the Devarāja of the Rūpadhātu; but neither is this evidence of an Indian provenience of the legend, which, as unambiguously stated in the text of Chang Yüe, hailed from Fu-lin. This additional annotation, certainly not devised in Fu-lin, was derived by the author from another tradition, which we now propose to examine, and which will shed unexpected light on the position held by India in the diffusion of this tale.

A contribution to the question whether the legend of the Diamond

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that interval. The counterpart of this sacred site may be viewed in China on the Island of P'u-t'o, in the so-called "P'an-t'o Rock," which is styled "Diamond Precious Stone," on which, according to local legend, the Bodhisatva Avalokiteçvara (Kuan-yin) sat enthroned; this Diamond-Seat, however, is nothing but a rocky bowlder, the top of which is reached by means of a ladder, where contemplative monks may often be seen absorbed by the religious practice of meditation (*dhyāna;* compare R. F. JOHNSTON, Buddhist China, p. 313, London, 1913). The Vajrāsana of Buddha, accordingly, has as much to do with the diamond in its quality of stone as, for instance, Dante's diamond throne on which the angel of God is seated (L'angel di Dio, sedendo in su la soglia, Che mi sembiava pietra di diamante.— *Purgatorio,* IX, 104–105). Here also it is a metaphor, referring, according to the one, to the firmness and constancy of the confessor, or, according to others, to the symbol of the solid fundament of the Church (Divina Commedia, ed. SCARTAZZINI, p. 371). In a text of the Japanese Shin sect, the question is of a "heart strong as the diamond" in the sense of a diamond-hard faith (H. HAAS, Amida Buddha, p. 122). Also the heart of the hardened sinner is compared with the diamond in Buddhist literature (H. WENZEL, Nāgārjuna's Friendly Epistle, p. 24, stanza 83; S. BEAL, The Suhrillekha or Friendly Letter, p. 31, stanza 85, London, 1892). The Manicheans used the word in a similar manner by way of illustration, when it is said in one of their writings that the Messenger of Light is the precious diamond pillar supporting the multitude of beings (CHAVANNES and PELLIOT, Traité manichéen, p. 90).

[1] MARCO POLO (*l. c.*) explains the presence of the serpents in a natural manner: "Moreover in those mountains great serpents are rife to a marvellous degree, besides other vermin, and this owing to the great heat. The serpents are also the most venomous in existence, insomuch that any one going to that region runs fearful peril; for many have been destroyed by these evil reptiles."

Valley was known in ancient India is furnished by the same work, *Liang se kung tse ki*, as supplied to us with the Fu-lin version of the legend. Here we read this story: "A large junk of Fu-nan (Cambodja) which had come from western India arrived (in China) and offered for sale a mirror of a peculiar variety of rock-crystal,[1] one foot and four inches across its surface, and forty catties in weight. On the surface and in the interior it was pure white and transparent, and displayed many-colored objects on its obverse. When held against the light and examined, its substance was not discernible. On inquiry for the price, it was given at a million strings of copper coins. The Emperor ordered the officials to raise this sum, but the treasury did not hold enough. Those traders said, 'This mirror is due to the action of the Devarāja of the Rūpadhātu.[2] On felicitous and joyful occasions he causes the trees of the gods[3] to pour down a shower of precious stones, and the mountains receive them. The mountains conceal and seize the stones, so that they are difficult to obtain. The flesh of big animals is cast into the mountains; and when the flesh in these hiding-places becomes so putrefied that it phosphoresces, it resembles a precious stone. Birds carry it off in their beaks, and this is the jewel from which this mirror is made.' Nobody in the empire understood this and dared pay that price."[4] This account gives us a clew as to how it happened that the Devarāja of the Rūpadhātu was linked with the aforesaid legend hailing from Fu-lin. Both legends are on record in the same book, and the author combined the one report with the other. There is no reason to wonder that the story of the Fu-nan traders was not comprehended in China. We ourselves should be completely at sea, did not the Western legends enlighten the mystery. The story-teller from Fu-nan either did not express himself very clearly or was not perfectly understood by his interpreter, or the text of the *Liang se kung tse ki* has come down to us in corrupt shape. It is indubitable, however, that the story here on record is an echo of the legend of the Diamond Valley. All its essential features clearly stand out,— the inaccessible mountains hoarding the stones, the casting of flesh on them, and birds securing the stones. The narrative is only obscure in omitting to state that the jewels ad-

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[1] Compare the writer's note on this subject in *T'oung Pao*, 1915, p. 200.

[2] See above, p. 7.

[3] This term corresponds to Sanskrit *devataru* ("tree of the gods"), a designation for the five miraculous trees to be found in Indra's Heaven,— *kalpavṛiksha*, *pārijāta*, *mandāra*, *saṁtāna*, and *haricandana* (compare HOPKINS, *Journal Am. Or. Soc.*, Vol. XXX, 1910, pp. 352, 353).

[4] *T'ai p'ing yü lan*, Ch. 808, p. 6 (the Chinese text will be found in *T'oung Pao* 1915, p. 202).

here to the flesh which is devoured by the birds, while the puerile intimation that the putrefaction of the flesh transforms it into stone is interpolated. The Fu-nan merchants had come to China from the shores of western India, and brought from there the expensive crystal mirror. With it came the story, and thus some form of the legend of the Diamond Valley must have existed in the western part of India at least in the beginning of the sixth century A.D. Certainly it was a much fuller and more intelligent version than that presented to us through the medium of the Fu-nan seafarers. Be this as it may, also India took its place in this universal concert of Asiatic nations; and our Chinese text has fortunately preserved the only Indian version thus far known, and now first revealed and explained. It is most interesting that the Indian tradition belongs to the type of the plain dramatic version, in which the by-play of the serpents is wanting; so is the Garuḍa; and the only specific Indian traits are the tree of the gods and the Devarāja Kubera. Aside from these incidents, which are inconclusive in stamping the legend as Indian in its origin, it thoroughly tallies with that of Epiphanius. For this and also chronological reasons it follows that Fu-lin was the centre from which the legend spread simultaneously to India and China. G. HUET[1] has recently given another interesting example of a story originating in western Asia, a weak echo of which was carried into India.

It is therefore my opinion that the legend of the Valley of Diamonds or Precious Stones in its two early variations, as represented by Epiphanius and Pseudo-Aristotle, whatever its antecedents and its possible associations with earlier stories of the Herodotian type may have been, originated in the Hellenistic Orient, and was propagated from this centre to China, to India, to the Arabs, and to Persia. The Chinese tradition of the *Liang se kung tse ki*, being an exact parallel to that of Epiphanius and approaching it more closely in time than any of the Arabic and other versions, being earlier and purer than that of Pseudo-Aristotle, presents an important contribution to the question, and shows that traditions of Fu-lin flowed into China long before its name was recorded in her official annals. The Chinese and Indian versions bear out still another significant point that may enable us to reconstruct the original form in which the subject was propagated in the Hellenistic world. It is manifest that Epiphanius, while by a lucky chance our earliest source on the matter, does not preserve the story in its primeval or pure form; he pursues a theological tendency by lining it up in his discourse on the

[1] Le conte du "mort reconnaissant" et le livre de Tobie (*Revue de l'histoire des religions*, Vol. LXXI, 1915, pp. 1–29).

stones in the breastplate of the Jewish High Priest, and focuses it on the hyacinth, which makes for too narrow a specialization to be creditable to the original. Certainly Epiphanius is not the author of the story, but merely its propagandist; it was folk-lore of his time which he imbibed and employed for his specific purpose. This point of view is upheld by our Chinese text, which records the story as a tradition coming from the Hellenistic Orient, and which clearly indicates also its object. The precious stones of anterior Asia had always wrought an unbounded fascination on the minds of the Chinese, and the scope of this tradition is to account for the enormous wealth in jewels possessed by the country Fu-lin. Here we have a bit of humorous wit, as offered by the inhabitants of Fu-lin in explanation of numerous queries addressed to them by foreign traders: it was a story freely circulating in Fu-lin, not centring around the hyacinth, but relating to precious stones in the widest sense. Such appears to have been the original story, and thus it is preserved to us by the Chinese. That Pseudo-Aristotle and his successors (except Tīfāshī with his relapse into the hyacinth) chose the diamond, is easily intelligible, the diamond being always deemed the foremost and most valuable of all precious stones.[1]

INDESTRUCTIBILITY OF THE DIAMOND.— The Taoist adept Ko Hung (fourth century A.D.) has the following notice on the diamond: "The kingdom of Fu-nan (Cambodja) produces diamonds (*kin kang* 金剛) which are capable of cutting jade. In their appearance they resemble fluor-spar.[2] They grow on stones like stalactites,[3] on the bottom of the sea to the depth of a thousand feet. Men dive in search for the stones, and ascend at the close of a day. The diamond when struck by an iron hammer is not damaged; the latter, on the contrary, will be

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[1] J. H. KRAUSE, Pyrgoteles, p. 29. The diamond is forestalled in the text of Epiphanius by the reference to the incombustible property of the stones.

[2] *Ts'e shi ying* 筴石英, thus identified by D. HANBURY, Notes on Chinese Materia Medica (*Pharmaceutical Journal*, 1861, p. 110), or Science Papers, p. 218. E. BIOT identified it with rock-crystal and smoky quartz (PAUTHIER and BAZIN, Chine moderne, Vol. II, p. 556).

[3] *Chung ju shi* 鐘乳石, identified by D. HANBURY (*l. c.*), with carbonate of lime in stalactitic masses, obtained from caves. The Chinese name, however, does not signify, as stated by Hanbury, "hanging- (like a bell) milk-stone," but the term *chung ju* refers to the mammillary protuberances or knobs on the ancient Chinese bells (see HIRTH, *Boas Anniversary Volume*, pp. 251, 257). GILES (No. 5691) has the name in the form *shi chung ju*, "stone-bell teats,— stalactites." Reduced to a powder the stone is used as a tonic. Compare F. PORTER SMITH, Contributions toward the Materia Medica of China, p. 204; GEERTS, Produits de la nature japonaise et chinoise, p. 342; F. DE MÉLY, Lapidaires chinois, pp. 92, 254. Important Chinese notes on this mineral are contained in the *Yün lin shi p'u* of Tu Wan (Ch. c, p. 8), *Ling-wai tai ta* of 1178 by Chou K'ü-fei (Ch. 7, p. 13), and *Pên ts'ao kang mu* (Ch. 9, p. 17 b).

spoiled. If, however, a blow is dealt at the diamond by means of a ram's horn,[1] it will at once be dissolved, and break like ice."[2]

The motive, diamonds being fished from the ocean, is an old Indian fable. We meet it in the *Suppāraka-jātaka*, No. 463 in the famous Pāli collection of Buddha's birth-stories. According to this legend, the diamonds are to be found in the Khuramāla Sea. The Bodhisatva was on board ship, acting as skipper for a party of merchants. He reflected that if he told them this was a diamond sea, they would sink the ship in their greed by collecting the diamonds. So he told them nothing; but having brought the ship to, he got a rope, and lowered a net as if to catch fish. With this he brought in a haul of diamonds, and stored them in the ship; then he caused the wares of little value to be cast overboard.[3] Of course, the Indian mineralogists knew better than that, and even enumerate eight sites where the diamond was found.[4]

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[1] According to another reading, "antelope, or chamois horn" (*ling yang kio*). The latter is said to be solid and to occur only in the High-Rock Mountains (*Kao shi shan*) of Annam (*Wu li siao shi*, Ch. 8, p. 21b; and *T'u shu tsi ch'êng, Pien i tien*, Annam, *hui k'ao* 6, p. 8b).

[2] *Pên ts'ao kang mu*, Ch. 10, p. 12. Compare P. PELLIOT, Le Fou-nan (*Bull. de l'Ecole française*, Vol. III, 1903, p. 281). The same notice has been embodied in the account of the country of Fu-nan contained in the New Annals of the T'ang Dynasty (*T'ang shu*, Ch. 222 B, p. 2; and PELLIOT, *l. c.*, p. 274). Fu-nan, of course, did not produce diamonds, as said by the T'ang Annals in this passage, but imported them from India, as attested by a statement in the same Annals (*T'ang shu*, Ch. 221 A, p. 10b) to the effect that India trades diamonds with Ta Ts'in (the Roman Orient), Fu-nan, and Kiao-chi. As both Indian diamonds and legends concerning them were encountered by the Chinese in Fu-nan, it was pardonable for them to believe that diamonds were a product of that country. Chao Ju-kua (translation of HIRTH and ROCKHILL, p. 111) says that the diamond of India will not melt, though exposed to the fire a hundred times.

[3] E. B. COWELL, The Jātaka, Vol. IV, p. 88. Compare also the Tibetan Dsang-lun, Ch. 30 (I. J. SCHMIDT, Der Weise und der Thor, pp. 227 *et seq.*); and SCHIEFNER, Tāranātha, p. 43. The Hindu mineralogists entertain also the notion that the diamond floats on the water (L. FINOT, Lapidaires indiens, p. XLVIII); and there is a fabulous account of a diamond of marine origin in the *Tsa pao tsang king* (BUNYIU NANJIO, Catalogue, No. 1329; CHAVANNES, Cinq cents contes et apologues, Vol. III, p. 1), translated from Sanskrit into Chinese in A.D. 472. A merchant from southern India who had an expert knowledge of pearls traversed several kingdoms, showing everywhere a pearl, the specific qualities of which nobody could recognize till he met Buddha, who said, "This wishing-jewel (*cintāmaṇi*) originates from the huge fish *makara*, whose body is two hundred and eighty thousand *li* (Chinese leagues) long. The name of this gem is 'hard like the diamond' (*kin-kang kien*, Chinese rendering of Sanskrit *vajrasāra*, an attribute of the diamond). It has the property of producing at once precious objects, clothing, and food, and securing everything according to one's wish. He who obtains this gem cannot be hurt by poison, or be burnt by fire." My translation is based on the text, as quoted in *Yüan kien lei han* (Ch. 364, p. 15b), the wording of which to some extent dissents from that translated by M. CHAVANNES (*l. c.*, p. 77).

[4] L. FINOT, Lapidaires indiens, p. XXV.

In the Jātaka, the notion of the pearl being born from the ocean[1] has been transferred to the diamond. Q. Curtius Rufus echoes this native tradition when, in his description of India, he says that the sea casts upon the shores precious stones and pearls, these offscourings of the boiling sea being valued at the price which fashion sets on coveted luxuries.[2]

The Chinese tradition transmitted from Fu-nan — that iron does not break the diamond, but that the latter breaks iron — is reflected in the same manner by PLINY, who says that the stones are tested upon the anvil, and resist the blows with the result that the iron rebounds, and the anvil splits asunder.[3] This certainly is pure fiction and merely a popular illustration of the hardness of the stone.[4] This notion has accordingly migrated, and the Physiologus presents the missing link between East and West by asserting that the diamond cannot be damaged by iron, fire, or smoke.[5] In India we meet the same test, inasmuch as a diamond is regarded as genuine if it is struck with other stones or iron hammers without bursting.[6] The fact that the Arabic treatises on mineralogy reiterate the same story need not be discussed here; for the account of Ko Hung is far older than these, and proves that long before the advent of the Arabs it passed from India to Fu-nan and from Fu-nan to China.

Discussing the phenomena of sympathy and apathy ruling in nature, PLINY sets forth that this indomitable power which contemns the two most violent agents of nature, iron and fire,[7] is broken by the blood of

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[1] *Ibid.*, p. XXXII. A Sanskrit epithet of the pearl is *samudraja* ("sea-born").

[2] J. W. MCCRINDLE, Invasion of India by Alexander, p. 187.

[3] Incudibus hi deprehenduntur ita respuentes ictus ut ferrum utrimque dissultet, incudes ipsae etiam exiliant (XXXVII, 15, § 57). Compare BLÜMNER, Technologie, Vol. III, p. 230.

[4] The diamond is hard, but not tough, and can easily be broken with the blow of a hammer. It is as brittle as at least the average of crystallized minerals (FARRINGTON, Gems and Gem Minerals, p. 70). The fabulous notion of the ancients was first refuted by GARCIA DA ORTA (or, ab Horto), in his work on the Drugs of India, which appeared in Portuguese at Goa in 1563. "It is out of the question," he says, "that the diamond resists the hammer; on the contrary, it can be pulverized by means of a small hammer, and may easily be pounded in a mortar with an iron pestle, the powder being used for the grinding of other diamonds" (compare J. RUSKA, Der Diamant in der Medizin, *Festschrift Baas*, p. 129). In the Italian translation of Garcia (p. 182, Venice, 1582) the passage runs thus: "Non è il vero, che il diamante resista alla botta del martello, percioche con ogni picciolo martello si riduce in polvere, e con grandissima facilità si pesta col pistello di ferro; e in questo modo lo pestano coloro, che con la sua polvere poliscono gli altri diamanti."

[5] F. LAUCHERT, Geschichte des Physiologus, p. 34.

[6] R. GARBE, Die indischen Mineralien, p. 82.

[7] PLINY, accordingly, was of the opinion that the diamond is able to resist fire, and DIOSCORIDES (L. LECLERC, Traité des simples, Vol. III, p. 272) acquiesced in

a ram, which, however, must be fresh and warm. The stone must be well steeped in it, and receive repeated blows, and even then will break anvils and iron hammers unless they be of excellent temper.[1] This fantasy has passed into the writings of ST. AUGUSTIN,[2] and, further, into our mediæval poets, who interpreted the ram's blood as the blood of Christ, likewise into our *lapidaires*.[3]

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this belief. THEOPHRASTUS (De lapidibus, 19; opera ed. F. WIMMER, p. 343), in a passing manner, alludes to the incombustibility of the diamond by ascribing the same property to the carbuncle (*anthrax*); the lack of humidity in these stones renders them impervious to fire (compare KRAUSE, Pyrgoteles, p. 15 and note 4). APOLLONIUS DYSCOLUS, in the first half of the second century A.D. (Rerum naturalium scriptores Graeci minores, ed. KELLER, Vol. I, p. 50), says that the diamond, when exposed to a fire, is not heated.

[1] Siquidem illa invicta vis, duarum violentissimarum naturae rerum ferri igniumque contemptrix, hircino rumpitur sanguine, neque aliter quam recenti calidoque macerata et sic quoque multis ictibus, tunc etiam praeterquam eximias incudes malleosque ferreos frangens (*ibid.*, § 59); also in the same work, XX, procemium: sanguine hircino rumpente.

[2] Qui lapis nec ferro nec igni nec alia vi ulla perhibetur praeter hircinum sanguinem vinci (De civitate Dei, XXI, 4). Also ISIDORUS, Origines, XII, 1, 14; and MARBODUS, De lapidibus pretiosis, 1.

[3] F. LAUCHERT, Geschichte des Physiologus, p. 179. L. PANNIER (Les Lapidaires français du moyen âge, p. 36):

"Par fer ne par foú n'iert ovréé
S'el sang del buc chiald n'est tempréé."

F. PFEIFFER, Buch der Natur von Konrad von Megenberg, p. 433; ALBERTUS MAGNUS, De virtutibus lapidum, p. 135 (Amstelodami, 1669). The origin of the Plinian story is hard to explain, as there is no other ancient or Oriental source that contains it. C. W. KING (Antique Gems, p. 107) thinks it is a jeweller's story, probably invented to keep up the mystery of the business. BLÜMNER (Technologie, Vol. III, p. 231) supposes either that the ancient lapidaries really used ram's blood in good faith, without examining whether the diamond could also be broken without it, or that they merely pretended such a procedure to the laymen as an alleged artifice of their trade. These rationalistic speculations, unsupported by evidence, are unsatisfactory. More plausible is the view of E. O. VON LIPPMANN (Abhandlungen und Vorträge, Vol. I, p. 83), that the blood of the ram, owing to the sensual lust of this animal, was regarded as particularly hot. As is well known, a ram was the animal sacred to Bacchus (O. KELLER, Antike Tierwelt, Vol. I, p. 305); and ram's blood was a remedy administered in cases of dysentery (F. DE MÉLY, Lapidaires grecs, p. 92). What merits special attention, however, is that Capricorn as asterisk of the zodiac, according to Manilius, belonged to Vesta; and that everything in need of fire, like mines, working of metals, even bakery, was under its influence. Moreover, in ancient astrology, the twelve signs of the zodiac are associated with twelve precious stones, and in this series *adamas* belongs to Capricorn (see the list in F. BOLL, Stoicheia, No. 1, p. 40). The idea of ram's blood acting upon the diamond, therefore, seems to be finally traceable to an astrological origin. A curious custom relating to ram's horn is reported by Strabo (XVI, 4, § 17). When the Troglodytæ of Ethiopia bury their dead, some of them bind the corpse from the neck to the legs with twigs of the buckthorn [*Paliurus;* an infusion of this plant, according to Strabo, forms the drink of these people in general]. They at once throw stones over the body, at the same time laughing and rejoicing, until they have covered its face. Thereupon

That our Chinese text above speaks of a ram's horn may be due to the fact that this modification was caused by the error of a scribe or by some misunderstanding of the Western tradition regarding ram's blood. More probably the people of Fu-nan (Cambodja), or even of India, are responsible for the alteration, which in this form was then picked up by the Chinese. The adequateness of the latter interpretation follows from an interesting passage in the book *Hüan chung ki* of the fifth century, quoted by Li Shi-chên, which concludes a notice of the diamond with the statement that in the countries of the West the nature of Buddha is metaphorically likened to the diamond, and ram's horn to the "impurity of passion" (*fan nao* 煩惱). This compound is a technical Buddhist term, being a translation of Sanskrit *kleça-kashāya*, the third of a series of five *kashāya*, five impurities or spheres of corruption.[1] Taken individually, these two emblematic figures of speech are unobjectionable; but what would it mean, that a ram's horn, symbolic of the impurity of passion, can break the Buddha, who has the nature of the diamond? This, from a Buddhistic angle, is unintelligible; the opposite would be true. The foundation of this symbolism, plainly, cannot be of Buddhistic origin; but the impetus was apparently received from a Christian source, and was re-interpreted in India. The matter

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they place over it a ram's horn and go away. In this case the ram's horn doubtless figures also as an instrument of extraordinary strength: it overpowers the body and soul of the deceased, keeping his spirit down and preventing it from a return to the former home, where it might do harm to the survivors. Therefore the mourners rejoice in accomplishing their purpose. Ram's heads were extensively employed in Greek art (H. WINNEFELD, Altgriech. Bronzebecken aus Leontini, *Progr. Winckelmannsfest*, No. 59, 1899). Ball's opinion that ram's blood is the outcome of Indian sacrifices held on the opening of a mine, discussed above on p. 15, is untenable, as there is no Indian tradition connecting the diamond with ram's blood. The baselessness of this theory is further demonstrated by the fact that the Chinese have altered the classical "ram's blood" into a "ram's horn;" and the Chinese account hailed from Fu-nan (Cambodja), a country with a strong impact of Indian civilization. The transformation, therefore, seems to have been effected in an Indian region. For this reason it is impossible to seek the origin of this idea in India, where apparently it was not understood and was changed into a "horn," which appears to have been regarded there as stronger than blood. As to the classical idea of heat suggested by ram's blood, it is noteworthy, however, that in late Indian art, Agni, the God of Fire, is represented as riding on a gray goat, flames of fire streaming round about him, his crown also being surrounded by fire (B. ZIEGENBALG, Genealogy of the South-Indian Gods, p. 191, Madras, 1869). Thus the conception of the ram or goat as an animal of fire is brought out,— a fire of such vehemence as to subdue the hardest body of nature.

[1] See EITEL, Handbook of Chinese Buddhism, p. 67; CHAVANNES, Cinq cents contes et apologues, Vol. I, p. 17; and O. FRANKE, Chin. Tempelinschrift, p. 51. F. DE MÉLY (Lapidaires chinois, p. 124) incorrectly understands that "in India the nature of Buddha is compared with the diamond; and his sadness, with the horn of the antelope *ling*."

will only become intelligible if we substitute "ram's blood" for "ram's horn" and interpret "ram's blood" as the blood of the Lamb, the Christian Saviour. This symbolic explanation has indeed been attached in the West to Pliny's ram's blood subduing the diamond. The idea is not found in the Physiologus, which compares the diamond itself with Christ (analogous to Buddha as the diamond), but it turns up in the mediæval poets. Frauenlob explains the destruction of the diamond through buck's blood as the salvation, saying that the *adamas* (diamond) of the hard curse was broken by the blood of Christ.[1]

DIAMOND AND LEAD.— Dioscorides of the first century A.D. observes on the diamond, "It is one of the properties of the diamond to break the stones against which it is brought into contact and pressed. It acts alike on all bodies of the nature of stone, with the exception of lead. Lead attacks and subdues it. While it resists fire and iron, it allows itself to be broken by lead, and this is the expedient employed to pulverize it."[2]

The oldest Arabic book on stones, sailing under the flag of Aristotle, reports in the chapter on the diamond, probably drawing from Dioscorides, that it cannot be overpowered by any other stone save lead, which is capable of pulverizing it.[3]

In a Syriac and Arabic treatise on alchemy of the ninth or tenth century, edited and translated by R. DUVAL, it is said that lead makes the diamond suffer; the translator understands this in the sense that lead serves for the working of the diamond, adding in a note that one worked the diamond and other precious stones, enclosed in sheets of lead, by means of ruby or diamond dust.[4] The action of lead on the diamond certainly is imaginary. This idea conveys the impression of having received its impetus from the circle of the alchemists. Muhammed Ibn Mansūr, who wrote a treatise on mineralogy in Persian during the thirteenth century, says regarding this point, "On the anvil, the diamond is not broken under the hammer, but rather penetrates into the anvil. In order to break the diamond, it is placed between lead, the latter being struck with a mallet, whereupon the stone is broken. Others, instead of using lead, envelop the diamond in resin or

[1] Compare F. LAUCHERT, Geschichte des Physiologus, p. 179. In the Cathedral of Troyes there is a sculpture from the end of the thirteenth century, representing the Lamb of God under the unusual form of a ram with large horns and bearing the Cross of the Resurrection. A. N. DIDRON (Christian Iconography, Vol. I, pp. 325, 326) styles this work a "most unaccountable anomaly," but the symbolism set forth above surely accounts for it.

[2] L. LECLERC, Traité des simples, Vol. III, p. 272.

[3] J. RUSKA, Steinbuch des Aristoteles, p. 149 (compare p. 76).

[4] M. BERTHELOT, La chimie au moyen âge, Vol. II, pp. 124, 136.

wax."[1] The Armenian *lapidarium* of the seventeenth century[2] is most explicit on the matter: "The diamond is bruised by means of lead in the following manner: lead is hammered out into a foil, on which the diamond is put; and when completely wrapped up with it, it is placed on an iron anvil, the lead being struck with an iron hammer. The diamond crumbles into pieces from these blows, but remains in the leaden foil, and is not dispersed into various directions, as it is prevented from so doing by the ductility of the lead. Released from the latter, the broken diamond is fit for work. In want of lead, the diamond is covered with wax and wrapped up in twelve layers of paper, whereupon it is smashed by hammer-blows. In order to secure it in pure condition and without loss, the whole mass is flung into boiling water, causing the wax to melt, the paper to float on the surface of the water, and the diamond-splinters to sink to the bottom of the vessel. Then it is pounded in a steel mortar and is at once ready for industrial purposes. With this pounded diamond (diamond-dust) the jewellers polish good and coarse diamonds." The practical object in the use of lead is here clearly indicated; but what appears in this work of recent date as a merely technical process was in its origin a superstitious act, as is explained by Tīfāshī, who wrote toward the middle of the thirteenth century. According to this author, the diamond, as stated by Pliny, is a golden stone; and in the same manner as gold is affected by lead, lead is able to pulverize the diamond.[3]

This Western idea has likewise migrated into China, and turns up in the *Tan fang kien yüan*, an alchemical work by Tu Ku-t'ao of the Sung period, according to whom lead can reduce the diamond to fragments.[4] This author terms the stone "metal-hard awl or drill" (*kin kang tsuan* 金剛鑽); that is, "diamond-point" (*kin kang* being the usual name for the diamond). According to Li Shi-chên, the author of the *Pên*

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[1] J. VON HAMMER, *Fundgruben des Orients*, Vol. VI, p. 132 (Wien, 1818); M. CLÉMENT-MULLOT, Essai sur la minéralogie arabe, p. 131 (*Journal asiatique*, 6th series, Vol. XI, 1868). Al-Akfānī expresses himself in a similar manner (WIEDEMANN, Zur Mineralogie im Islam, p. 218).

[2] Russian translation of K. P. PATKANOV, p. 1.

[3] A. RAINERI BISCIA, Fior di pensieri, p. 53 (2d ed., Bologna, 1906).

[4] *Pên ts'ao kang mu*, Ch. 10, p. 12. The author speaks of a certain kind of lead styled "lead with purple back" (*tse pei yüan* 紫背鉛), in regard to which the *Pên ts'ao kang mu* only says that it is a variety of lead very pure and hard, able to cut the diamond (compare GEERTS, Les produits de la nature japonaise et chinoise, p. 605). Geerts annotates, "Ceci est une de ces absurdités que l'on trouve si souvent chez les auteurs chinois à côté de renseignements exacts et utiles." Certainly, the Chinese are not responsible for this "absurdity," which comes straight from our classical antiquity.

ts'ao kang mu, this name first occurs in the dictionary *Shi ming*, while the usual mineralogical designation is *kin kang shi* ("metal-hard stone"). Also Pseudo-Aristotle has the diamond "boring" all kinds of stones and pearls, and Qazwīnī styles it a "borer." Li Shi-chên says that "by means of diamond-sand jade can be perforated and porcelain repaired, hence the name awl (*tsuan*)."[1] An interesting analogy to this conception occurs in the Arabic stories of Sindbad the Sailor, dating in the ninth century. Sindbad tells, "Walking along the valley I found that its soil was of diamond, the stone wherewith they pierce jewels and precious stones and porcelain and onyx, for that it is a hard dense stone, whereon neither iron nor steel has effect, neither can we cut off aught therefrom nor break it, save by means of the load-stone." We shall now discuss one of the most interesting problems bearing on the diamond,— the ancient employment of the diamond-point.

THE DIAMOND-POINT.— In the book going under the name of the alleged philosopher Lie-tse, which in the text now before us is hardly earlier than the Han period, we read the following story:[2] "When King Mu of the Chou Dynasty (1001–945 B.C.) was on an expedition against the Western Jung, the latter presented him with a sword of *kun-wu* 鋸鋙之劒 and with fire-proof cloth (asbestos). The sword was one foot and eight inches in length, was forged from steel, and had a red blade; when handled, it would cut hard stone (jade) as though it were merely clayish earth." The object of these notes is to discuss the nature of the substance *kun-wu*. Asbestine stuffs were received by the Chinese from the Roman Orient, and likewise the curious tales connected with them. If asbestos came from that direction, our first impression in the matter is that also the substance *kun-wu* appears to have been derived from the same quarter; and this supposition will be proved correct by a study of Chinese traditions.

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[1] It is interesting that the Chinese, while they worked jade and porcelain, and, as will be seen farther below, also pearls, by means of diamond-points, did not know the fact that the latter can cut glass,— perhaps merely for the reason that they never understood how to make plate-glass. The ancients did not cut glass, either, with the diamond, and this practice does not seem to have originated before the sixteenth century (compare BECKMANN, Beiträge zur Geschichte der Erfindungen, Vol. III, p. 543). In recent times, however, the Chinese applied the diamond also to glass. Archdeacon GRAY, in his interesting book Walks in the City of Canton (p. 238, Hongkong, 1875), tells how the glaziers of Canton cut with a diamond the designs traced with ink upon the surface of glass globes and readily effect this labor by running the diamond along these ink-lines.

[2] Ch. 5, *T'ang wên*, at the end (compare E. FABER, Naturalismus bei den alten Chinesen, p. 132; L. WIEGER, Pères du système taoiste, p. 149; A. WYLIE, Chinese Researches, pt. III, p. 142). The work of Lie-tse is first mentioned as a book in eight chapters in *Ts'ien Han shu* (Ch. 30, p. 12 b).

The *kun-wu* sword of Lie-tse has repeatedly tried the ingenuity of sinologues. HIRTH,[1] who accepted the text at its surface value, regarded this sword as the oldest example in Chinese records of a weapon made from iron or steel; and while the passage could not be regarded as testimony for the antiquity of the sword-industry in China, it seems to him to reflect the legendary views of that epoch and to hint at the fact that the forging of swords in the iron-producing regions of the north-west of China was originally invested in the hands of the Huns. Thus Hirth finally arrived at the conclusion that the *kun-wu* sword may actually mean "sword of the Huns." FABER, the first translator of Lie-tse, regarded it as a Damascus blade; and FORKE[2] accepted this view. F. PORTER SMITH[3] was the first to speak of a *kun-wu* stone, intimating that "extraordinary stories are told of a stone called *kun-wu*, large enough to be made into a knife, very brilliant, and able to cut gems with ease." He also grouped this stone correctly with the diamond, but did not cope with the problem involved.

The *Shi chou ki* ("Records of Ten Insular Realms"), a fantastic description of foreign lands, attributed to the Taoist adept Tung-fang So, who was born in 168 B.C.,[4] has the following story: "On the Floating Island (Liu chou) which is situated in the Western Ocean is gathered a quantity of stones called *kun-wu* 昆吾石. When fused, this stone turns into iron, from which are made cutting-instruments brilliant and reflecting light like crystal, capable of cutting through objects of hard stone (jade) as though they were merely clayish earth."[5]

Li Shi-chên, in his *Pên ts'ao kang mu*,[6] quotes the same story in his notice of the diamond, and winds up with the explanation that the *kun-wu* stone is the largest of diamonds. The text of the *Shi chou ki*, as quoted by him, offers an important variant. According to his reading, *kun-wu* stones occur in the Floating Sand (Liu-shá) of the Western Ocean.[7] The latter term, as already shown, in the Chinese

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[1] Chinesische Ansichten über Bronzetrommeln, pp. 20, 21.

[2] *Mitteilungen des Seminars*, Vol. VII, 1, p. 162. This opinion was justly criticised by the late E. HUBER (*Bull. de l'Ecole française*, Vol. IV, p. 1129).

[3] Contributions toward the Materia Medica of China, p. 75.

[4] The work is adopted in the Taoist Canon (L. WIEGER, Taoisme, Vol. I, No. 593). The authorship of Tung-fang So is purely legendary, and the book is doubtless centuries later. Exactly the same text is given also in the *Lung yü ho t'u* (quoted in *Yüan kien lei han*, Ch. 323, p. 1; and in the commentary to *Shi ki*, Ch. 117, p. 2 b), a work which appears to have existed in the fourth or fifth century (see BRETSCHNEIDER, Bot. Sin., pt. 1, No. 500).

[5] *P'ei wên yün fu*, Ch. 100 A, p. 16; or *Yüan kien lei han*, Ch. 26, p. 32 b.

[6] Ch. 10, p. 12.

[7] Also the *Wu li siao shi* (Ch. 8, p. 22) has this reading.

records relative to the Hellenistic Orient, refers to the Mediterranean; and Liu-sha is well known as a geographical term of somewhat vague definition, first used in the Annals of the Later Han Dynasty, and said to be in the west of Ta Ts'in, the Chinese designation of the Roman Orient.[1] Liu-sha, in my opinion, is the model of Liu chou, the Floating Island being distilled from Floating Sand in favor of the Ten Islands mechanically constructed in that fabulous book. Accordingly, we have here a distinct tradition relegating the *kun-wu* stone to the Anterior Orient; and Li Shi-chên's identification with the diamond appears plausible to a high degree. His opinion is strongly corroborated by another text cited by him. This is the *Hüan chung ki* by Kuo[2] of the fifth century, who reports as follows: "The country of Ta Ts'in produces diamonds (*kin-kang*), termed also 'jade-cutting swords or knives.' The largest reach a length of over a foot, the smallest are of the size of a rice or millet grain.[3] Hard stone can be cut by means of it all round, and on examination it turns out that it is the largest of diamonds. This is what the Buddhist priests substitute for the tooth of Buddha."[4] Chou Mi, quoted above regarding the legend of the Dia-

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[1] HIRTH, China and the Roman Orient, pp. 42, 292. F. DE MÉLY (Lapidaires chinois, p. 124) translates "River Liu sha," and omits the "Western Ocean." The term Liu-sha existed in early antiquity and occurs for the first time in the *Shu king*, chap. *Yü kung* (LEGGE, Chinese Classics, Vol. III, pp. 132, 133, 150), denoting the then known farthest west of the country, the desert extending west of the district of Tun-huang in Kan-su. It is cited also in the elegy *Li sao* by Kü Yüan (XIII, 89; LEGGE, *Journal R. As. Soc.*, 1895, pp. 595, 863), in the records of the Buddhist pilgrims (CHAVANNES, Religieux éminents, p. 12), and in the memoirs of the mediæval travellers (BRETSCHNEIDER, Mediæval Researches, Vol. I, p. 27; Vol. II, p. 144). See also PELLIOT, *Journal asiatique*, 1914 (Mai-Juin), p. 505.

[2] His personal name is unknown.

[3] PLINY (XXXVII, 15, § 57) speaks of a kind of diamond as large as a grain of millet (milii magnitudine) and called *cenchros;* that is, the Greek word for "millet."

[4] F. DE MÉLY (Lapidaires chinois, p. 124) incorrectly understands by this passage that the bonzes of India adorn with diamonds the tooth of Buddha. In fact, a diamond itself was passed off as Buddha's-tooth relic. A specific case to this effect is on record: "In the period Chêng-kuan (627–650) there was a Brahmanic priest who asserted that he had obtained a tooth of Buddha which when struck resisted any blow with unheard-of strength. Fu Yi heard of it, and said to his son, 'It is not a tooth of Buddha; I have heard that the diamond (*kin-kang shi*) is the strongest of all objects, that nothing can resist it, and that only an antelope-horn can break it; you may proceed to make the experiment by knocking it, and it will crash and break' " (*P'ei wên yün fu*, Ch. 100 A, p. 40 b). Fu Yi, who was a resolute opponent of Buddhism and was raised to the office of grand historiographer by the founder of the T'ang dynasty (he died in 639; see *Mémoires concernant les Chinois*, Vol. V, pp. 122, 159; LEGGE, *Journal Roy. As. Soc.*, 1893, p. 800), was certainly right. Compare H. DORÉ, Recherches sur les superstitions en Chine, Vol. VIII, p. 310. Also PALLADIUS (Chinese-Russian Dictionary, Vol. II, p. 203 a) is inexact in saying that the Buddhists passed off the diamond as Buddha's tooth in China, where the diamond was unknown. Regarding Buddha's-tooth relic, besides the various

mond Valley, states, "The workers in jade polish jade by the persevering application of river-gravel, and carve it by means of a diamond-point. Its shape is like that of the ordure of rodents;[1] it is of very black color, and is at once like stone and like iron." Chou Mi apparently speaks of the impure, black form of the diamond, which is still used by us for industrial purposes, the tipping of drills and similar boring-instruments.[2] These texts render it sufficiently clear that the *kun-wu* stone of the *Shi chou ki*, which is found in the Hellenistic Orient, is the diamond,[3] and that the cutting-instrument made from it is a diamond-point. The alleged transmutation of the stone into iron is further elucidated by the much-discussed passage of Pliny, "When by a lucky chance the diamond happens to be broken, it is triturated into such minute splinters that they can hardly be sighted. These are much demanded by gem-engravers and are enclosed in iron. There is no hard substance that they could not easily cut by means of this instrument."[4]

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accounts of Hüan Tsang, see Fa Hien, Ch. 38 (LEGGE, Record of Buddhistic Kingdoms, pp. 105–107); CHAVANNES, Mémoire sur les religieux éminents, p. 55; DE GROOT, *Album Kern*, p. 134; YULE and CORDIER, Book of Ser Marco Polo, Vol. II, pp. 319, 329–330, etc. The Pāli Chronicle of Ceylon describes a statue of Buddha, in which the body and members were made of jewels of different colors; the commentary adds that the teeth were made of diamonds (W. GEIGER, Mahāvaṁsa, p. 204). It accordingly was an Indian idea (not an artifice conceived in China) that the diamond could be substituted for Buddha's tooth. It is curious that Pseudo-Aristotle warns against taking the diamond in the mouth, because it destroys the teeth (RUSKA, Steinbuch des Aristoteles, p. 150). The poet Su Shi (1036–1101), in his work *Wu lei siang kan chi* (WYLIE, Notes, p. 165), remarks that antelope-horn is able to break Buddha's tooth to pieces; in this case, Buddha's tooth is a synonyme for the diamond, and we have an echo of Ko Hung's legend above referred to (p. 21).

[1] *Shu shi* 鼠矢, incorrectly rendered by F. DE MÉLY (Lapidaires chinois, p. 124) by "arrow-point." The word *shi* is here not "arrow," but "ordure, dung" (*shi* in the third tone); the text of the *Wu li siao shi* indeed writes *shi* 屎, which is the proper character; and *Ko chi king yüan* (Ch. 33, p. 3 b), in quoting the same text of Chou Mi, offers the variant *shu fên* 鼠糞, which has the same meaning.

[2] Known in the trade as "bort,"— defective diamonds or fragments of diamonds which are useless as gems.

[3] The reflective and refractive power of the diamond is well illustrated in the definition of that book, "brilliant and reflecting light like crystal." The coincidence with PLINY'S (XXXVII, 15, § 56) description of the Indian *adamas* is remarkable, "which occurs not in gold, but in a substance somewhat cognate to crystal, not differing from the latter in its transparent coloration" (Indici non in auro nascentis et quadam crystalli cognatione, siquidem et colore tralucido non differt). The opinion that diamond, according to its composition, was a glass-like stone of the nature of rock-crystal, prevailed in Europe till the end of the eighteenth century, when it was refuted by Bergmann in 1777, and experiments demonstrated that the diamond is a combustible body (F. VON KOBELL, Geschichte der Mineralogie, p. 388).

[4] Cum feliciter contigit rumpere, in tam parvas friatur crustas, ut cerni vix possint. Expetuntur hae scalptoribus ferroque includuntur, nullam non duritiam

Dioscorides of the first century A.D. distinguishes four kinds of diamonds, the third of which is called "ferruginous" because it resembles iron, but iron is heavier; it is found in Yemen. According to him, the adamantine fragments are stuck into iron handles, being thus ready to perforate stones, rubies, and pearls.[1] The concept of a mysterious association of the diamond with iron survived till our middle ages. KONRAD VON MEGENBERG, in his Book of Nature, written in 1349–50,[2] observes that, according to the treatises on stones, the virtue of the diamond is much greater if its foundation be made of iron, in case it is to be set in a ring; but the ring should be of gold to be in keeping with the dignity of the stone.

If we now glance back at the text of Lie-tse, from which we started, we shall easily recognize that the *kun-wu* sword mentioned in it is in fact only a mask for the diamond-point; for Lie-tse, with reference to this sword, avails himself of exactly the same definition as the *Shi chou ki*, expressed in the identical words,— "cutting hard stone (jade) as though it were merely clayish earth,"— and the jade-cutting knife (*tao*) is unequivocally identified with the diamond in the *Hüan chung ki*. The passage in Lie-tse, therefore, rests on a misunderstanding or a too liberal interpretation of the word *tao* 刀, which means a cutting-instrument in the widest sense, used for carving, chopping, trimming, paring, scraping, etc. It may certainly mean a dagger or sword with a single edge; and Lie-tse, or whoever fabricated the book inscribed with his name, exaggerated it into the double-edged sword *kien*.[3] Then he was certainly obliged to permit himself the further change of making this sword of tempered steel;[4] and by prefixing the classifier *kin* ('metal') to the words *kun* and *wu*, the masquerade was complete for eluding the most perspicacious sinologues.[5] Lie-tse's *kun-wu* sword is a romantic

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ex facili cavantes (XXXVII, 15, § 60). It is not necessary, as proposed by F. DE MÉLY (Lapidaires chinois, p. 257), to make a distinction between *kin kang shi* ("diamond") and *kin kang ts'uan* ("emery"). It plainly follows from the Chinese texts that the latter is the diamond-point (see below, p. 34).

[1] Compare L. LECLERC, Traité des simples, Vol. III, p. 272.

[2] Ed. of F. PFEIFFER, p. 433.

[3] The conception of the diamond as a sword had perhaps been conveyed to China from an outside quarter. In the language of the Kirgiz, the word *almas*, designating the "diamond" (from Arabic *almās*), has also the significance "steel" (in the same manner as the Greek *adamas*, from which the Arabic word is derived), and *ak almas* ("white diamond") is a poetical term for a "sword" (W. RADLOFF, Wörterbuch der Türk-Dialecte, Vol. I, col. 438).

[4] This metamorphosis was possibly somehow connected with the original meaning "steel" inherent in the Greek word *adamas*.

[5] The missing link is found in another passage of the *Shi chou ki*, where the same event is described as in Lie-tse. It runs as follows: "At the time of King Mu of the

fiction evolved from the *kun-wu* diamond-points heard of and imported from the Hellenistic Orient. It has nothing to do with the sword industry of the Huns or Chinese, as speculated by Hirth; nor is it a Damascus blade, as suggested by Faber and Forke. Such books as Lie-tse and many others of like calibre cannot be utilized as historical sources for archæological argumentation; their stories must first be analyzed, critically dissected, scrutinized, and correlated with other texts, Chinese as well as Western, to receive that stamp of valuation which is properly due them. It is now clear also why Lie-tse links the *kun-wu* sword with asbestos, inasmuch as the two are products of the Hellenistic Orient. The circumstance that both are credited to King Mu is a meaningless fable. King Mu was the chosen favorite and hero of Taoist legend-makers, to whose name all marvellous objects of distant trade were attached (in the same manner as King Solomon and Alexander in the West). The introduction of the Western Jung on this occasion possibly is emblematic of the intermediary rôle which was played by Turkish tribes in the transmission of goods from the Anterior Orient and Persia to China.[1]

As regards the history of the diamond, we learn that the Chinese, before they became acquainted with the stone as a gem, received the first intimation of it in the shape of diamond-points for mechanical work, sent from the Hellenistic Orient,— known first (at the time of the Han) under the name *kun-wu;* in the third century (under the Tsin), as will be shown below, under the name *kin-kang;* and later on, as *kin-kang tsuan.* It seems that the Chinese made little or no

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Chou dynasty the Western Hu presented a jade-cutting knife of *kun-wu*, one foot long, capable of cutting jade as though it were merely clayish earth." In this text (quoted in *P'ei wên yün fu*, Ch. 19, p. 13) the word *tao* is used, and *kun-wu* is plainly written without the classifiers *kin*. Here we have the model after which Lie-tse worked. The term *kun-wu tao*, written in the same style as in *Shi chou ki*, appears once more in the biography of the painter Li Kung-lin (*Sung shi*, Ch. 444, p. 7), who died in 1106. The Emperor had obtained a seal of nephrite, which his scholars, despite long deliberations, could not decipher till Li Kung-lin diagnosed it as the famous seal of Ts'in Shi Huang-ti made by Li Se in the third century B.C. (compare CHAVANNES, *T'oung Pao*, 1904, p. 496). On this occasion the painter said that the substance nephrite is hard, but not quite so hard as a diamond-point (*kun-wu tao*).

[1] It is interesting that the diamond appears also in the cycle of Si-wang-mu, the legendary motives of which, in my opinion, to a large extent go back to the Hellenistic Orient. In the *Han Wu-ti nei chuan* (p. 2 b; ed. of *Shou shan ko ts'ung shu*), the goddess appears wearing in her girdle a magic seal of diamond (*kin-kang ling si*). The work in question, carried by an unfounded tradition into the Han period, is a production of much later times, but seems to have existed in the second half of the sixth century (PELLIOT, *Bulletin de l'Ecole française*, Vol. IX, p. 243; and *Journal asiatique*, 1912, Juillet-Août, p. 149).

use of the diamond for ornamental purposes, and did not understand how to work it.[1]

Not only have the Chinese stories about the diamond-point, but there is also proof for the fact that this implement was among them a living reality turned to practical use. Li Sün, the author of the *Hai yao pen ts'ao*,— an account of the drugs of southern countries, written in the second half of the eighth century,[2]—discusses the genuine pearl found in the southern ocean, and observes that it can be perforated only by the diamond-point (*kin-kang tsuan*).[3] The poet Yüan Chên (779–831), his contemporary, says in a stanza, "The diamond-point bores jade, the sword of finely tempered steel[4] severs the floating down."

The preceding accounts have conveyed the impression that the diamond-points employed by the Chinese were plain implements of the shape of an awl tipped with a diamond. A different instrument is described in the *Hüan chung ki*, a work of the fifth century, which has already been quoted from the *Pên ts'ao kang mu*. In the great cyclopædia *T'ai p'ing yü lan*[5] the passage of this book concerning the diamond is handed down as follows: "The diamond comes from India and the country of Ta Ts'in (the Roman Orient). It is styled also 'jade-cutting knife,' as it cuts jade like an iron knife. The largest reach a

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[1] The *Nan chou i wu chi* (Account of Remarkable Objects in the Southern Provinces, by Wan Chen of the third century) states that the diamond is a stone, in appearance resembling a pearl, hard, sharp, and matchless; and that *foreigners* are fond of setting it in rings, which they wear in order to ward off evil influences and poison (*T'ai p'ing yü lan*, Ch. 813, p. 10).— The Polyglot Dictionary of K'ien-lung (Ch. 22, p. 65) discriminates between *kin-kang tsuan* ("diamond-point") and *kin-kang shi* ("diamond stone"). The former corresponds to Manchu *paltari*, Tibetan *p'a-lam*, and Mongol *ocir alama;* the latter, to Manchu *palta wehe* (*wehe*, "stone"), Tibetan *rdo p'a-lam* (*rdo*, "stone"), and Mongol *alama cilagu* (the latter likewise means "stone"). The Manchu words are artificial formations based on the Tibetan word. Mongol *alama* apparently goes back to Arabic *almās* (Russian *almaz*), Uigur and other Turkish dialects *almas* (Osmanli *elmas*), ultimately traceable to Greek-Latin *adamas*. Al-Akfānī writes the word *al-mās*, the initials of the stem being mistaken by him for the native article *al* (WIEDEMANN, Zur Mineralogie im Islam, p. 218).

[2] BRETSCHNEIDER, Bot. Sin., pt. 1, p. 45.

[3] *Pên ts'ao kang mu*, Ch. 46, p. 3 b; *Chêng lei pên ts'ao*, Ch. 20, fol. 12 b (edition of 1523). Al-Akfānī says in the same manner that the pearl is perforated only by means of the diamond (E. WIEDEMANN, Zur Mineralogie im Islam, p. 221).

[4] *Pin t'ie*. Julien's opinion that the diamond is understood by this term is erroneous, and was justly antagonized by MAYERS (*China Review*, Vol. IV, 1875, p. 175). Regarding this steel imported into China by Persians and Arabs, see BRETSCHNEIDER, Mediæval Researches, Vol. I, p. 146; WATTERS, Essays on the Chinese Language, p. 434; HIRTH and ROCKHILL, Chau Ju-kua, p. 19.

[5] Ch. 813, p. 10 (edition of Juan Yüan, 1812).

length of over a foot, the smallest are of the size of a rice-grain. In order to cut jade, it is necessary to make a large gold ring, which is held between the fingers; this ring is inserted into the jade-cutting knife, which thus becomes fit for work." This description is not very clear, but I am under the impression that an instrument on the order of our roller-cutter is understood.

This investigation may be regarded also as a definite solution of a problem of classical archæology, which for a long time was the subject of an extended and heated controversy.[1] The Chinese, though receiving the diamond-point from the Occident, have preserved to us more copious notes and clearer and fuller texts regarding this subject than the classical authors; and if hitherto it was possible to cast doubts on Pliny's description of diamond-splinters (above, p. 31), which have been taken by some authors for diamond-dust, this scepticism is no longer justified in the light of Chinese information. What Pliny describes is indeed the diamond-point, and the accurate descriptions of the Chinese fully bear out this fact.

DIAMOND AND GOLD.— The earliest passage of fundamental historical value in which the diamond is clearly indicated occurs in the *Tsin k'i kü chu* 晉起居注,[2] and is handed down to us in two different versions. One of these runs as follows:[3] "In the third year of the period Hien-ning (A.D. 277), Tun-huang[4] presented to the Emperor diamonds (*kin-kang*). Diamonds are the rulers in the midst of gold (or preside in the proximity of gold 主金中). They are neither washed,[5] nor can they be melted. They can cut jade, and come from (or are produced in) India." The other version of this text, ascribed to

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[1] The chief arguments are discussed below on pp. 42–46.

[2] The term *k'i kü chu* 起居注 designates a peculiar class of historical records dealing with the acts of prominent persons and sovereigns. The first in existence related to the Han Emperor Wu. The well-known *Mu t'ien-tse chuan* (Life of the Emperor Mu) agreed in style and make-up with the *k'i kü chu* which were extant under the Sui dynasty (see *Sui shu*,Ch. 33, p. 7). Under the Tsin quite a number of books of this class were written, which are enumerated in the chapter on Sui litera ture quoted. Judging from the titles there given, each must have embraced a fixed year-period; hence the passage quoted above must have been contained in the *Tsin Hien-ning k'i kü chu*, that is, Annotations on the Conditions of the Period Hien-ning (275–280) of the Tsin Dynasty, a work in ten chapters, written by Li Kuei 李軌. Nineteen other titles of works of this type referring to the Tsin period, and apparently all contemporary records, are preserved in the *Sui shu* and were utilized at that time; thus the *Tsin k'i kü chu* is quoted in the biography of Yü-wên K'ai 宇文愷 in the Sui Annals.

[3] *T'ai p'ing yü lan*, Ch. 813, p. 10.

[4] In the north-western corner of Kan-su, near the border of Turkistan.

[5] As is the case with gold-sand.

the same work, is recorded thus:[1] "In the thirteenth year of the reign of the Emperor Wu (A.D. 277) there was a man in Tun-huang, who presented the Court with diamond jewels (*kin-kang pao*). These are produced in the midst of gold (生金中). Their color is like that of fluor-spar,[2] and in their appearance they resemble a grain of buckwheat. Though many times fused, they do not melt. They can cut jade as though it were merely clayish earth." It is manifest that these two texts, from their coincidence chronologically, are but variants referring to one and the same event, under the Tsin dynasty (265–419); and it is likewise apparent that the text as preserved in the *T'ai p'ing yü lan*, the great cyclopædia published by Li Fang in 983, bears the stamp of true originality, while that in the *P'ien tse lei pien* is made up of scraps borrowed from the *Pao p'u tse* of Ko Hung (p. 21) and Lie-tse's notice of *kun-wu* (p. 28).[3] From this memorable passage we may gather several interesting facts: diamonds were traded in the second part of the third century from India by way of Turkistan to Tun-huang for further transmission inland into China proper; and the chief characteristics of the stone were then perfectly grasped by the Chinese, particularly its property of cutting other hard stones. The most important gain, however, for our specific purpose, is the observation that a bit of Plinian folk-lore is mingled with the Chinese account. We are at once reminded of Pliny's statement that *adamas* was the name given to a nodosity of gold, sometimes, though but rarely, found in the mines in company with gold, and that it seemed to occur only in gold.[4] Pseudo-

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[1] *P'ien tse lei pien*, Ch. 71, p. 11 b.

[2] See above, p. 21.

[3] A third variant occurs in *Yüan kien lei han* (Ch. 361, p. 18 b), where the term "diamond" is, strangely enough, suppressed. This text runs thus: "The Books of the Tsin by Wang Yin say that in the third year of the period Hien-ning (A.D. 277), according to the *K'i kü chu*, from the district of Tun-huang were brought to the Court objects found in gold caves, which originate in gold, are infusible, and can cut jade."

[4] Ita appellabatur auri nodus in metallis repertus perquam raro [comes auri] nec nisi in auro nasci videbatur (XXXVII, 15, § 55). Also Plato is credited with having entertained a similar notion (KRAUSE, Pyrgoteles, p. 10; H. O. LENZ, Mineralogie der alten Griechen und Römer, p. 16; BLÜMNER, Technologie, Vol. III, p. 230; and in Pauly's Realenzyklopädie, Vol. IX, col. 322); although others, like E. O. VON LIPPMANN (Abhandlungen und Vorträge, Vol. II, p. 39), are not convinced that Plato's *adamas* means the diamond. The note in BOSTOCK and RILEY'S translation of Pliny (Vol. VI, p. 406) — that "this statement cannot apply to the diamond as known to us, though occasionally grains of gold have been found in the vicinity of the diamond" — is not to the point. On the contrary, it is a well-established fact that the diamond does occur in connection with gold; and this experience even led to the discovery of diamond-mines in the Ural. Owing to the similarity between the Brazilian and Uralic gold and platina sites, Alexander von Humboldt, in 1823,

Aristotle, in the introduction to his work, philosophizes on the forces of nature attracting or avoiding one another. To these belongs gold that comes as gold-dust from the mine. When the diamond encounters a grain of it, it pounces on the gold, wherever it may be in its mine, till the union is accomplished.[1] Qazwīnī speaks of an amicable relationship between gold and the diamond, for if the diamond comes near gold, it clings to the latter; also it is said that the diamond is found only in gold-mines.[2] A commentary to the *Shan hai king*[3] has the following: "The diamond which is produced abroad belongs to the class of stones, but resembles gold (or metal) and has a brilliant splendor. It can cut jade. The foreigners wear it in the belief that it wards off evil influences." It is therefore highly probable that the first element (*kin*) in the Chinese compound *kin-kang* was really intended to convey the meaning "gold" (not "metal" in general), and that the term was framed in consequence of that tradition reaching Tun-huang, and ultimately traceable to classical antiquity. A further intimation as to the significance of the newly-coined term we receive in the same period, that of the Tsin dynasty, when the stone and its nature were perfectly known in China. Indeed, it is several times alluded to in the official Annals of the Tsin Dynasty (265–419). At that time "a saying was current among the people of Liang,[4] that the principle of the diamond of the Western countries is strength, and that for this reason the name *kin-kang* was conferred upon it in Liang."[5] In combining this information with the previous text of the *Tsin k'i kü chu*, we arrive at the conclusion that the term *kin-kang* reflects two traditions,— the word *kin* referring to the origin of the diamond in gold, the word *kang* alluding to its

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expressed the idea that the diamond accompanying these two metals in Brazil should be discovered also in the Ural; under the guidance of this prognostic, the first diamonds were really found there in 1829 (BAUER, Edelsteinkunde, 2d ed., p. 292). The diamonds of California have been found in association with gold-bearing gravels, while washing for gold (FARRINGTON, Gems and Gem Minerals, p. 87). The statement of Pliny proves that he indeed speaks of the diamond.

[1] J. RUSKA, Steinbuch des Aristoteles, p. 129.

[2] RUSKA, Steinbuch aus der Kosmographie des al-Qazwīnī, p. 6.

[3] Quoted in *Yüan kien lei han*, Ch. 26, p. 46.

[4] Liang is the name of one of the nine provinces (*chou*) into which China was anciently divided by the culture-hero and semi-historical Emperor Yü, comprising what is at present Sze-ch'uan and parts of Shen-si, Kan-su, and Hu-pei (regarding the boundaries of Liang-chou, see particularly LEGGE, Chinese Classics, Vol. III, pp. 119–120). Liang-chou was one of the nineteen provinces into which China was divided under the Tsin dynasty, with Wu-wei (in Kan-su) as capital (compare PITON, *China Review*, Vol. XI, p. 299).

[5] *Tsin shu*, Ch. 14, p. 16. The Annals of the Tsin Dynasty were compiled by Fang Hüan-ling (578–648).

extreme hardness, likewise emphasized by Pliny; *kin-kang*, accordingly, means "the hard stone originating in gold."[1]

In our middle ages we meet the notion of adamantine gold which is credited with the same properties as the diamond. In the famous letter, purported to have been addressed by Prester John to the Byzantine Emperor Manuel, and written about 1165, a floor in the bakery of the alleged palace of the Royal Presbyter in India is described as being of adamantine gold, the strength of which can be destroyed neither by iron, nor fire, nor any other remedy, save buck's blood.[2]

THE TERM "KUN-WU."— It is difficult to decide the origin of the word *kun-wu*. It would be tempting to regard it as a transcription of the Greek or West-Asiatic word denoting the diamond-point; unfortunately, however, the Greek designation for this implement is not known. More probably the Chinese term may be derived from an idiom spoken in Central Asia; at any rate, the word itself was employed in China before the introduction of diamond-points from the West. In a poem of Se-ma Siang-ju, who died in 117 B.C., we meet a precious stone named *kun-wu* 琨珸, as occurring in Sze-ch'uan, on the nature of which the opinions of the commentators dissent.[3] The *Han shu yin i* explains it as the name of a mountain which produces excellent gold. Shi-tse or Shi Kiao (about 280 B.C.) explains it as "gold" or "metal of Kun-wu" 昆吾之金, which may mean that he takes the latter as

[1] In the study of Chinese texts some precaution is necessary in the handling of the term *kin kang*, which does not always refer to the diamond, but sometimes presents a complete sentence with the meaning "gold is hard." Three examples of this kind are known to me. One occurs in *Nan shi* (biography of Chang T'ung; see *Pien tse lei pien*, Ch. 71, p. 11b): "Gold is hard, water is soft: this is the difference in their natural properties." In *Tsin shu* (Ch. 95, p. 13b; biography of Wang Kia) we meet the sentence 金固火彊. This, of course, could mean "the diamond is conquered by fire,"— a sentence which, from the standpoint of our scientific experience, would be perfectly correct; from a Chinese viewpoint, however, it would be sheer nonsense, the Chinese as well as the ancients entertaining the belief that fire does not affect the diamond (p. 23). The passage really signifies, "Gold is hard, yet is overcome (melted) by fire." The correctness of this translation is confirmed by a passage in a work *Yi shi fêng kio* (quoted in *Pien tse lei pien, l. c.*), where the same saying occurs in parallelism with two preceding sentences: "Branches of trees fall and return to their roots; water flows from the roots and returns to the branches; gold is hard, yet is overcome by fire; every one returns to his native place."

[2] Pavimentum vero est de auro adamantino, fortitudo cuius neque ferro neque igne neque alio medicamine potest confringi sine yrcino [hircino] sanguine (F. ZARNCKE, Der Priester Johannes I, p. 93). Compare the analogous passage in the same document, "Infra domum sunt duae magnae molae, optime ad molendum dispositae, factae de adamante lapide, quem namque lapidem neque lapis neque ignis neque ferrum potest confringere." Both these passages are not contained in the original draught of the letter, but are interpolations from manuscripts of the thirteenth century.

[3] *Shi ki*, Ch. 117, p. 2b.

the name of the locality whence the ore came. Se-ma Piao (240–305) interprets it as a stone ranking next to jade. Then follows in his text the story of *kun-wu* in Liu-sha, quoted from the *Lung yü ho t'u*, which has been discussed above. I do not know whether this is a separate editorial comment, or was included in the commentary of Se-ma Piao. At all events, the fact is borne out that the word *kun-wu* in the *Shi ki*, and that referring to the West, are considered by the Chinese as identical, and that the mode of writing (with or without the classifier 'jade') is immaterial.[1] We know that in times of old numerous characters were written without the classifiers, which were but subsequently added. The writing *kun-wu* in Lie-tse with the classifier 'metal' plainly manifests itself as a secondary move,[2] and the simple *kun-wu* without any determinative classifier doubtless represents the primary stage. This is shown also by the existence of a character 𥑮, where the element *kun* is combined with the classifier 'stone.'[3] If in the *Shi ki* the word *kun-wu* is linked with the classifier 'jade;' and if, further, this term appears coupled with nine other designations of stones, the whole series of ten being introduced by the words "following are the stones,"—the interpretation "gold" is absurd, and that of Se-ma Piao has only a chance. It would therefore be possible that *kun-wu* originally served for naming some hard stone indigenous to Sze-ch'uan, and was subsequently transferred to the imported diamond-point. The name for the stone may have been inspired by that of the mountain Kun-wu, stones being frequently named in China for the mountains or localities from which they are derived. On the other hand, there is a text in which the name *Kun-wu* in this connection is conceived as that of a clan or family by the addition of the word *shi* 氏. This is the *Chou shu*,[4] which relates the tradition that the Western Countries offered fire-proof cloth (asbestos), and the Kun-wu Clan presented jade-cutting knives. It seems certain that this version has no basis in reality, but presents a makeshift to account for the troublesome word *kun-wu*. How it sprang into existence may be explained from the fact that there was in ancient times, under the Hia dynasty, a rebel by the name Kun-wu, mentioned in the *Shi king* and *Shi ki*;[5] but it is obvious that this family name bears

[1] In *Ts'ien Han shu*, where the same text is reproduced, *kun-wu* is written without the classifiers.

[2] In all likelihood this is merely a device of later editors of Lie-tse's text. There are editions in which the plain *kun-wu* without the classifier is written (see *P'ei wên yün fu*, Ch. 91, p. 16b).

[3] *P'ei wên yün fu*, Ch. 100 A, p. 25.

[4] Regarding this work see CHAVANNES, Mémoires historiques de Se-ma Ts'ien, Vol. V, p. 457. The passage is quoted in *Po wu chi*, Ch. 2, p. 4b (Wu-ch'ang edition).

[5] LEGGE, Chinese Classics, Vol. III, p. 642; CHAVANNES, *l. c.*, Vol. I, p. 180.

no relation to the name of the mountain in Sze-ch'uan, the stone hailing from it, and the diamond-point coming from the West.[1]

Ko Hung informs us that "the Emperor Wên of the Wei dynasty (220–226), who professed to be well informed with regard to every object in nature, declared that there were no such things in the world as a knife that would cut jade, and fire-proof cloth; which opinion he recorded in an essay on the subject. Afterwards it happened that both these articles were brought to court within a year; the Emperor was surprised, and caused the essay to be destroyed; this course being unavoidable when he found the statements to be without foundation."[2] General Liang-ki, who lived at the time of the Emperor Huan (147–167), is said to have possessed asbestos and "jade-cutting knives."[3] The book handed down under the name of K'ung-ts'ung-tse[4] contains the tradition that the Prince of Ts'in obtained from the Western Jung a sharp knife capable of cutting jade as though it were wood. The poet Kiang Yen (443–504) wrote a poem on a bronze sword, in the preface of which he observes that there are also red knives of cast copper capable of cutting jade like clayish earth,— apparently a reminiscence of the passage of Lie-tse, only the latter's "iron" is replaced by "copper." In the preceding texts the term *kun-wu* is avoided, and only the phrase "jade-cutter" (*ko yü tao*) has survived.

TOXICOLOGY OF THE DIAMOND.— Contrary to his common practice, Li Shi-chên does not state whether the diamond is poisonous or not. As to the curative powers of the stone, he asserts that when set into hair-spangles, finger-rings, or girdle-ornaments, it wards off uncanny influences, evil, and poisonous vapors.[5] On this point the Chinese agree with PLINY, according to whom *adamas* overcomes and neutralizes

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[1] Also HIRTH (Chinesische Ansichten über Bronzetrommeln, p. 20) persuaded himself that this proper name is not connected with what he believed to be the "*kun-wu* sword." It is difficult, however, to credit the theory that the name *kun-wu*, as tentatively proposed by Hirth, could be a transcription on an equal footing with *Hiung-nu* (Huns). Aside from phonetic obstacles, the fact remains that the Chinese notices of *kun-wu* do not point in the direction of the Huns, but refer to Liu-sha in Ta Ts'in (the Roman Orient).

[2] A. WYLIE, Chinese Researches, pt. III, p. 151.

[3] *Yüan kien lei han*, Ch. 225, p. 2; and WYLIE, *l. c.*, p. 143.

[4] The son of K'ung Fu, a descendant of Confucius in the ninth degree, who died in 210 B.C. (GILES, Biographical Dictionary, p. 401). It is doubtful whether the book which we nowadays possess under the title K'ung-ts'ung-tse (incorporated in the *Han Wei ts'ung shu*) is the one which he wrote (compare CHAVANNES, Mémoires historiques de Se-ma Ts'ien, Vol. V, p. 432). The passage referred to is quoted in *P'ei wên yün fu*, Ch. 91, p. 21.

[5] The source for this statement doubtless is the *Nan chou i wu chi*, quoted on p. 34, which ascribes this notion to foreigners.

poisons, dispels insanity, and drives away groundless apprehensions from the mind.[1] The coincidence would not be so remarkable were it not for the fact that in mediæval Mohammedanism the theory of diamonds being poisonous had been developed. This idea first looms up in Pseudo-Aristotle, who is also the first to stage the snakes in the Diamond Valley, and cautions his readers against taking the diamond in their mouths, because the saliva of the snakes adheres to it so that it deals out death.[2] According to al-Bērūnī, the people of Khorasan and Iraq employ the diamond only for purposes of boring and poisoning.[3] This superstition was carried by the Mohammedans into India, where the belief had prevailed that the diamond wards off from its wearer the danger of poison.[4] The people of India now adhere to the superstition that diamond-dust is at once the least painful, the most active, and most infallible of all poisons. In our own time, when Mulhar Ráo of Baroda attempted to poison Col. Phayre, diamond-dust mixed with arsenic was used.[5] A. BOETIUS DE BOOT (1550–1632)[6] was the first modern mineralogical writer who refuted the old misconception, demonstrating that the diamond has no poisonous properties whatever.

IMITATION DIAMONDS.— While all the principal motives of the lore garnered by the Chinese around the diamond come from classical regions, I can discover but a single notion traceable to India. PLINY has written a short chapter on the method of testing precious stones,[7] but he does not tell us how to discriminate between real and counterfeit diamonds. According to the Hindu mineralogists, iron, topaz, hyacinth, rock-crystal, cat's-eye, and glass served for the imitation of the diamond; and the forgery was disclosed by means of acids, scratching,

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[1] Adamas et venena vincit atque inrita facit et lymphationes abigit metusque vanos expellit a mente (XXXVII, 15, § 61).

[2] J. RUSKA, Steinbuch des Aristoteles, p. 150; and Diamant in der Medizin (*Festschrift Baas*, pp. 121–125); likewise al-Akfānī (E. WIEDEMANN, Zur Mineralogie im Islam, p. 219). Qazwīnī (J. RUSKA, Steinbuch aus der Kosmographie des al-Kazwīnī, p. 35) quotes Ibn Sīnā as saying that the venomous property imputed by Aristotle to the diamond is a hollow pretence, and that Aristotle is ignorant of the fact that snake-poison, after flowing out, loses its baleful effect, especially when some time has elapsed. This sensible remark does not prevent Qazwīnī, in copying his second anonymous source relating to the diamond, from alleging that "it is an extremely mortal poison."

[3] E. WIEDEMANN, *Der Islam*, Vol. II, p. 352.

[4] L. FINOT, Lapidaires indiens, p. 10. Varāhamihira (A.D. 505–587) states that a good diamond dispels foes, danger from thunder-strokes or poison, and promises many enjoyments (H. KERN, Verspreide Geschriften, Vol. II, p. 98).

[5] W. CROOKE, Things Indian, p. 379.

[6] Gemmarum et lapidum historia, p. 124 (ed. of A. Toll, Lugduni Batavorum, 1636); compare also J. RUSKA, *Festschrift Baas*, pp. 125–127.

[7] XXXVII, 76.

and the touchstone. The *Agastimata* is specific on this point by anathematizing forgers and recommending the following recipe: "The vile man who fabricates false diamonds will sink into an awful hell, charged with a sin equal to murder. When a connoisseur believes that he recognizes an artificial diamond, he should test it by means of acids or vinegar, or through application of heat: if false, it will lose color; if true, it will double its lustre. It may also be washed and brought in contact with rice: thus it will at once be reduced to a powder."[1] The *Ts'i tung ye yü* of Chou Mi, previously quoted, imparts this advice: "In order to distinguish genuine from counterfeit diamonds, expose the stone to red-heat and steep it in vinegar: if it retains its former appearance and does not split, it is real. When the diamond-point happens to become blunt, it should be heated till it reddens; and on cooling off, it will again have a sharp point."[2] The first experiment is identical with that proposed in the Sanskrit text. As to the second, we again encounter a striking parallel in Pliny: "There is such great difference in stones, that some cannot be engraved by means of iron, others may be cut only with a blunt graver, all, however, by means of the diamond; heating of the graver considerably intensifies the effect."[3]

ACQUAINTANCE OF THE ANCIENTS WITH THE DIAMOND.— The previous notes have been based on the supposition that the stone termed *adamas* by the ancients, and that called *kun-wu* (or subsequently *kin-kang*) by the Chinese, are identical with what we understand by "diamond." This identification, however, has been called into doubt by students of classical antiquity as well as by sinologues. It is therefore necessary to scrutinize their arguments. Our investigation has clearly brought out two points,— first, that the Chinese notices of the diamond-point (*kun-wu*) agree with Pliny's account of the same implement; and, second, that Chinese traditions regarding the stone *kin-kang* perfectly coincide with those of the ancients and the Arabs concerning *adamas* and *almās*, the latter word being derived from the former. If,

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[1] L. FINOT, Lapidaires indiens, p. XXX.

[2] F. DE MÉLY (Lapidaires chinois, p. 124) has misunderstood this passage by referring it to the stone in lieu of the diamond-point. "S'il a des facettes émoussées, on le chauffe au rouge, on le laisse refroidir, et ses facettes redeviennent aiguës." This point of view is untenable. First, the facets of a diamond are neither blunt nor sharp; second, a faceted diamond, as will be shown in detail farther on, was always unknown to the Chinese, who for the first time noticed cut diamonds in the possession of the Macao Portuguese; and, third, the parallelism with Pliny proves my conception of the Chinese text to be correct.

[3] Iam tanta differentia est, ut aliae ferro scalpi non possint, aliae non nisi retuso, omnes autem adamante. Plurimum vero in iis terebrarum proficit fervor (XXXVII, 76, § 200). Compare KRAUSE, Pyrgoteles, p. 231.

accordingly, the *adamas* of the Greeks and Romans be the diamond, the continuity of Western and Eastern traditions renders it plain that the Chinese stone *kin-kang* must be exactly the same; if, however, *adamas* should denote another stone, the claim for *kin-kang* as the diamond must lose its force. Eminent archæologists like Lessing, Krause, Blümner, and Babelon, have championed the view that Pliny's *adamas* is our diamond.[1] The opposition chiefly came from the camp of mineralogists. E. S. DANA[2] remarked upon the word *adamas*, "This name was applied by the ancients to several minerals differing much in their physical properties. A few of these are quartz, specular iron ore, emery, and other substances of rather high degrees of hardness, which cannot now be identified. It is doubtful whether Pliny had any acquaintance with the real diamond." This rather sweeping statement does not testify to a sound interpretation of Pliny's text. A recent author asserts,[3] "It is more than doubtful if the true diamond was known to the ancients. The consensus of the best opinions is that the adamas was a variety of corundum, probably our white sapphire." Let us now examine what the foundation of these "best opinions" is.

The very first sentence with which PLINY opens his discussion of *adamas* is apt to refute these peremptory assertions: "The greatest value among the objects of human property, not merely among precious stones, is due to the adamas, for a long time known only to kings, and even to very few of these."[4] The most highly prized and valued of all antique gems, the "joy of opulence,"[5] should be quartz, specular iron ore, emery, and other substances which cannot now be identified! The ancients were not so narrow-minded that almost any stone picked up anywhere in nature could have been regarded as their precious stone foremost in the scale of valuation. If the peoples of India likewise regarded the diamond as the first of the jewels, if their treatises on mineralogy assign to it the first place,[6] and if Pliny is familiar with the

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[1] Also so eminent an historian of natural sciences as E. O. VON LIPPMANN (Abhandlungen und Vorträge, Vol. I, p. 9) grants to Pliny a knowledge of the diamond.

[2] System of Mineralogy, p. 3, 1850. In the new edition of 1893 this passage has been omitted; the first distinct mention of the diamond is ascribed to Manilius (!), and Pliny's *adamas* is allowed to be the diamond in part.

[3] D. OSBORNE, Engraved Gems, p. 271 (New York, 1912).

[4] Maximum in rebus humanis, non solum inter gemmas, pretium habet adamas, diu non nisi regibus et iis admodum paucis cognitus (XXXVII, 15, § 55; again 78, § 204).

[5] Opum gaudium (PLINY, proœmium of Lib. XX).

[6] L. FINOT, Lapidaires indiens, p. XXIV. Buddhabhaṭṭa (*ibid.*, p. 6) says, "Owing to the great virtue attributed by the sages to the diamond, it must be studied in the

adamas of India, it is fairly certain that also the *adamas* is the diamond; it is, at any rate, infinitely more certain than that the jewel first known only to kings should have been quartz, specular iron ore, emery, or some other unidentified substance. That emery is not meant by Pliny becomes evident from the fact that emery was well known to the ancients under the name *naxium*.[1] The Indian diamond is perfectly well described by Pliny as an hexangular crystal resembling two pyramids placed base to base; that is, the octahedral form in which the diamond commonly crystallizes.[2] Whether the five other varieties spoken of by Pliny are real diamonds or not is of no consequence in this connection; two of these he himself brands as degenerate stones. The name very probably served in this case as a bare trademark. Diamonds at that time were scarce, and the demand was satisfied by inferior stones. That such were sold under the name of "diamond" does not prove that the ancients were not acquainted with the true diamond. The diamond of India was known to them,[3] and

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first place." P. S. IYENGAR (The Diamonds of South India, *Quarterly Journal of the Mythic Society*, Vol. III, 1914, p. 118) observes, "Among the Hindu, both ancient and modern, the diamond is always regarded as the first of the nine precious gems (*navaratna*)."

[1] BLÜMNER, Technologie, Vol. III, pp. 198, 286. In Greek it is styled *σμύρις*. "Emery is the stone employed by the engravers for the cutting of gems" (DIOSCORIDES, CLXVI).

[2] This passage has embarrassed some interpreters of Pliny (H. O. LENZ, Mineralogie der alten Griechen und Römer, p. 163; A. NIES, Zur Mineralogie des Plinius, p. 5), because they did not grasp the fact that it is the octahedron which has six points or corners (sexangulus); and thus such inadequate translations were matured as "its highly polished hexangular and hexahedral form" (BOSTOCK and RILEY, Natural History of Pliny, Vol. VI, p. 406). No body, of course, can simultaneously be hexangular and hexahedral, the hexahedron being a cube with six sides and four points. Pliny's wording is plain and concise, and his description tallies with the Sanskrit definition of the diamond as "six-cornered" (*shaṭkona*, *shaṭkoṭi*, or *shaḍāra;* see R. GARBE [Die indischen Mineralien, p. 80], who had wit enough to see that this term hints at the octahedron and correctly answers to the diamond; likewise L. FINOT, Lapidaires indiens, p. XXVII). It is not impossible that the Plinian definition is an echo of a tradition hailing, with the diamond, directly from India.

[3] The Indian diamond is mentioned also by PTOLEMY, according to whom the greatest bulk of diamonds was found with the Savara tribe (PAULY, Realenzyklopädie, Vol. I, col. 344), by the Periplus Maris Erythraei (56, ed. FABRICIUS, p. 98), and by DIONYSIUS PERIEGETES (second century A.D.) in his poem describing the habitable earth (Orbis descriptio, Verse 1119). The diamond is doubtless included also among the precious stones cast by the sea upon the shores of India, mentioned by CURTIUS RUFUS, and among STRABO's precious stones, some of which the Indians collect from among the pebbles of the river, and others of which they dig out of the earth (MCCRINDLE, Invasion of India by Alexander, pp. 187–188). Alexander's expedition made the Greeks familiar with the diamond, hence it is mentioned by THEOPHRASTUS (De lapidibus, 19), who compares the carbuncle with the adamas. I do not agree with the objections raised by some authors against Theophrastus'

the Periplus[1] expressly relates of the exportation from India of diamonds and hyacinths. Further, the Annals of the T'ang Dynasty[2] come to our aid with the statement that India has diamonds, sandal-wood, and saffron, and barters these articles with Ta Ts'in (the Roman Orient), Fu-nan, and Kiao-chi. The fact therefore remains, as attested by the Chinese, that India shipped diamonds to the West.[3]

There is, moreover, in the chapter of Pliny, positive evidence voicing the cause of the diamond. He is familiar with the hardness of the stone, which is beyond expression (quippe duritia est inenarrabilis); and, owing to its indomitable powers, the Greeks bestowed on it the name *adamas* ("unconquerable").[4] He is acquainted, as set forth on p. 31, with the technical use of diamond splinters, which cut the very hardest substances known. If one of the apocryphal varieties of the diamond, styled *siderites* (from Greek *sideros*, "iron"), a stone which shines like iron, is reported to differ in its main properties from the true diamond, inasmuch as it will break when struck by the hammer, and admit of being perforated by other kinds of *adamas*, this observation

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acquaintance with the diamond. H. BRETZL (Botanische Forschungen des Alexanderzuges) has well established the fact that he commanded an admirable knowledge of the vegetation of India; thus he may well have heard also of the Indian diamond from his same informants. It is not necessary to assume, however, that he knew the diamond from autopsy, as he does not describe it, but mentions it only passingly in the single passage referred to; also H. O. LENZ (Mineralogie der alten Griechen und Römer, p. 19) holds the same opinion. It is difficult to see that Theophrastus could have compared with the carbuncle any other stone than the diamond.

[1] Ch. 56 (ed. of FABRICIUS, p. 98). G. F. KUNZ (Curious Lore of Precious Stones, p. 72) observes, "The writer is disinclined to believe that the ancients knew the diamond." The same author, however, believes in the existence of diamonds in ancient India; but Rome then coveted all the precious stones of India, and he who accepts the Indian diamond as a fact must be consistent in granting it to the ancients, too.

[2] *T'ang shu*, Ch. 221A, p. 10b.

[3] Indian diamonds were apparently traded also to Ethiopia, for Pliny records the opinion of the ancients that the *adamas* was only to be discovered in the mines of Ethiopia between the temple of Mercury and the island of Meroë (veteres eum in Aethiopum metallis tantum inveniri existimavere inter delubrum Mercuri et insulam Meroën). Ajasson's comment that the Ethiopia here mentioned is in reality India, and that the "Temple of Mercury" means the *Brahmaloka*, or "Temple of Brahma" (it does not mean "temple," but "world" of Brahma) is of course wrong. The reference to Meroë, the capital of Ethiopia, at once renders this opinion impossible; besides, Pliny's geographical terminology is always distinct as to the use of India and Ethiopia. The tradition of Ethiopic diamonds is confirmed by the Greek Romance of Alexander (III, 23), in which Queen Candace in the palace of Meroë presents Alexander with a crown of diamonds (*adamas;* see A. AUSFELD, Der griechische Alexanderroman, pp. 101, 192).

[4] *Invictum* is given by Pliny himself (procemium of lib. XX) as if it were a translation of the Greek word. The Physiologus says that the stone is called *adamas* because it overpowers everything, but itself cannot be overpowered.

plainly bears out the fact that Pliny and his contemporaries knew very well the properties of the real diamond, and, moreover, that diamond affects diamond. In short, due allowance being made for inaccuracies of the tradition of the Plinian text and the imperfect state of mineralogical knowledge of that period, no fair criticism can escape from the conclusion that Pliny's *adamas* is nothing but the diamond. The fact that also other stones superficially resembling diamonds were at that time taken for or passed off as diamonds, cannot change a jot of this conclusion. Such substitutes have been in vogue everywhere and at all times, and they are not even spared our own age.[1] Pliny's condemnation of these as not belonging to the genus (degeneres) and only enjoying the authority of the name (nominis tantum auctoritatem habent) reveals his discriminative critical faculty and his ability to distinguish the real thing from the frame-up. The perpetuity of the Plinian observations in regard to the *adamas* among the Arabs, Persians, Armenians, Hindu, and Chinese, who all have focussed on the diamond this classical lore inherited by him, throws additional evidence of most weighty and substantial character into the balance of the ancients' thorough acquaintance with the real diamond. The Arabs, assuredly, were not feeble-minded idiots when they coined their word *almās* from the classical *adamas* for the designation of the diamond, and this test of the language persists to the present day. The Arab traders and jewellers certainly were sufficiently wide awake to know what a diamond is, and their Hindu and Chinese colleagues were just as keen in recognizing diamonds, long before any science of mineralogy was established in Europe. The world-wide propagation of the same notions, the same lore, the same valuation connected with the stone, is iron-hard proof for the fact that in the West and East alike this stone was the diamond. This uniformity, coherence, perpetuity, and universality of tradition form a still mightier stronghold than the interpretation of the Plinian text. For this double reason there can be no doubt also that the *kin-kang* of Chinese tradition is the diamond.

CUT DIAMONDS.— Another question is whether the ancients were cognizant of the diamond in its rough natural state only, or whether they understood how to cut and polish it. This problem has caused

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[1] There were rock-crystals found in northern Europe in the seventeenth century and passed under the name of diamond. JOHANNES SCHEFFER (Lappland, p. 416, Frankfurt, 1675) tells that the lapidaries sometimes used to polish these crystals or diamonds of Lapland and to sell them as good diamonds, even frequently deceive experts with them, because they are not inferior in lustre to the Oriental stones. In the eighteenth century crystal was still called "false diamond" (J. KUNCKELL, Ars Vitraria, p. 451, Nürnberg, 1743).

an endless controversy. LESSING, in his "Briefe antiquarischen Inhalts" (No. 32), which it is still as enjoyable as profitable seriously to study, has shown with a great amount of acumen that the ancients possessed no knowledge whatever of diamond-dust, and therefore did not know how to polish the diamond. This opinion, however, did not remain uncontradicted. The opposite view is heralded by BLÜMNER,[1] who argues, "Despite the lack of positive testimony, we cannot forbear assuming that the ancients understood, though possibly imperfectly, how to polish the diamond. Since only in this state is the stone capable of displaying its marvellous lustre, play of colors, and translucency, its extraordinary valuation among the ancients would not be very intelligible had they known it merely as an uncut gem." This argument is rather sentimental and intuitive than well founded. As far as the plain facts are concerned, Lessing is right; and, what is even more remarkable, has remained right from 1768, the date at which he wrote, up to the present. No cut diamond of classical antiquity has as yet come to light; and in order to pass audaciously over the body of Pliny, and have us believe what he does not say, such a palpable piece of evidence would be indispensable. As a matter of fact, neither Pliny nor any other ancient writer loses a word about diamond-dust; nor does he mention that the diamond can be cut and polished, or that it was so treated; nor does he express himself on the adamantine lustre.[2] This silence is sufficiently ominous to guard ourselves, I should think, against the rash assumption that the ancients might have cut the diamond. Its high appreciation is quite conceivable without the application of this process, for even the uncut diamond possesses brilliancy and lustre enough to allure a human soul. The possibility would remain that the ancients may have received worked diamonds, ready made, straight from India.[3]

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[1] Technologie, Vol. III, p. 233.

[2] BECKMANN (Beiträge zur Geschichte der Erfindungen, Vol. III, p. 541) held that the ancients employed diamond-dust for the cutting of stones other than the diamond, but he denied that they polished the diamond with its own dust. This is certainly a contradiction in itself: if the ancients knew the utility of diamond-dust, there is no reason why they should not have applied it to the diamond; and if they did not facet diamonds, it is very plain that they lacked the knowledge of diamond-dust. BAUER (Edelsteinkunde, p. 302, 2d ed.) observes, "In how far the ancients understood how to polish diamonds, or at least to improve existing crystal surfaces by polishing, is not known with certainty. From the traditions handed down, however, it becomes evident that this art was not wholly unknown to the ancients." The latter statement is without basis.

[3] This hypothesis was formulated by H. O. LENZ (Mineralogie der alten Griechen und Römer, pp. 39, 164, Gotha, 1861), who concluded from what the ancients said regarding the brilliancy of the stone that diamonds cut and polished in the country of their origin were traded to Europe.

Here, again, it is unfortunate that our knowledge fails us: the ancient Indian sources exhibit the same lack of information on the identical points as does Pliny. S. K. AIYANGAR[1] justly points out that in the description of the diamond, as given in the Arthaçāstra (quoted above, p. 16), "there is nothing to warrant the inference that diamonds were artificially cut; but, perhaps, the fact that diamonds were used to bore holes in other substances makes it clear that lapidary work was not unknown." A very late work on gems, the *Agastimata*, in an appendix of still later date, contains a curious passage in which the cutting of diamonds is prohibited: "The stone which is cut with a blade, or which is worn out by repeated friction, becomes useless, and its benevolent virtue disappears; the stone, on the contrary, which is absolutely natural has all its virtue." L. FINOT,[2] to whom we owe the edition and translation of this work, rightly points out that cutting and polishing are clearly understood here; but another passage in the same treatise speaks of it as a normal process, without forbidding what precedes the setting of diamonds for ornaments, and we regret with Finot that these passages cannot be dated. GARCIA AB HORTO, who wrote in 1563, informs us that by the people of India natural diamonds were preferred to the cut ones, in opposition to the Portuguese.[3] TAVERNIER (1605–89) describes the diamond-polishing in the Indian mines by means of diamond-dust.[4] In the face of the *Agastimata* and Garcia's statements, suspicion is ripe that diamond-cutting was introduced into India only by the Portuguese,[5] and that the employment of uncut stones was the really national fashion of India. The passage in the additional chapter of the *Agastimata*, as stated, cannot be dated with certainty, but it seems more probable that it falls within the time of the Portuguese era of India than that it

[1] *Quarterly Journal of the Mythic Society*, Vol. III, p. 130.

[2] Lapidaires indiens, p. xxx.

[3] Si come una vergine si preferisce ad una donna corrotta, cosi il diamante dalla natura polito, e acconcio s'ha da preferire à quello, che dall'arte è stato lavorato. Al contrario fanno i Portughesi, stimando più quelli, che sono dall'artificio dell' huomo acconci, e lavorati (Italian edition, p. 180).

[4] "There are at this mine numerous diamond-cutters, and each has only a steel wheel of about the size of our plates. They place but one stone on each wheel, and pour water incessantly on the wheel until they have found the 'grain' of the stone. The 'grain' being found, they pour on oil and do not spare diamond-dust, although it is expensive, in order to make the stone run faster, and they weight it much more heavily than we do. . . . The Indians are unable to give the stones so lively a polish as we give them in Europe; and this, I believe, is due to the fact that their wheel does not run so smoothly as ours" (ed. of V. BALL, Vol. II, pp. 57, 58).

[5] Also BAUER (Edelsteinkunde, p. 302, 2d ed.) is of the opinion that the diamond-cutting of Europe, which was developed from the end of the middle ages, has not remained without influence upon India, and that perhaps the process was introduced from Europe into India, or was at least resuscitated there.

should be much earlier. It is safer to adopt this point of view, as the *Ratnaparīkshā* of Buddhabhaṭṭa, who presumably wrote somewhat earlier than the sixth century, does not mention the cutting of diamonds,[1] nor does the mineralogical treatise of Narahari from the fifteenth century.[2] At all events, we have as yet no ancient source of Indian literature in which the cutting of diamonds is distinctly set forth. The discovery of such a passage, or, what is still more preferable, archæological evidence in the shape of ancient cut diamonds, may possibly correct our knowledge in the future. For the present it seems best to adhere to the view that the polishing of diamonds was foreign to ancient India, and a process but recently taught by European instructors. Certainly, we should not base our present conclusions on hoped-for future discoveries, which may even never be made, nor should we shift evidence appropriate to the last centuries into times of antiquity, nor is there reason to persuade ourselves that the knowledge of the diamond on the part of the Indians goes back to the period of a boundless antiquity (see p. 16). The Chinese contribute nothing to the elucidation of this problem; and certain it is that they merely kept the diamonds in the condition in which they received them from the Roman Orient, Fu-nan, India, and the Arabs, without attempting to improve the appearance of the stones. The European tradition that Ludwig van Berquen of Brügge in 1476 was the "inventor" of the process of polishing diamonds by means of diamond-dust, is, of course, nothing more than a conventional story (*une fable convenue*). As shown by BAUER,[3] diamonds were roughly or superficially polished as early as the middle ages; and Berquen improved the process and arranged the facets with stricter regularity, whereby the color effect was essentially enhanced.[4] The early history of the technique in Europe is not yet exactly ascertained.[5]

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[1] L. FINOT (*l. c.*, p. XXX), it is true, alludes to a passage of this work where, in his opinion, it is apparently the question of diamond-polishing. The text, however, runs thus: "The sages must not employ for ornament a diamond with a visible flaw; it can serve only for the polishing of gems, and its value is slight." This only means that deficient diamonds were used for the working of stones other than the diamond.

[2] R. GARBE, Die indischen Mineralien, pp. 80–83.

[3] *L. c.*, p. 303.

[4] The Berquen legend was firmly established in the seventeenth century, under the influence of one of his descendants. ROBERT DE BERQUEN (in his book Les merveilles des Indes orientales et occidentales, p. 13, Paris, 1669), after disdainfully talking about the rough diamonds obtained from India, soars into this panegyric of his ancestor: "Le Ciel doua ce Louis de Berquen qui estoit natif de Bruges, comme un autre Bezellée, de cet esprit singulier ou genie, pour en trouver de luy mesme l'invention et en venir heureusement à bout." Then follows the story of the "invention."

[5] H. SÖKELAND (*Zeitschrift für Ethnologie*, Vol. XXIII, 1891, Verhandlungen, p. 621) took up this question again, and thought that definite proof had not been

On the other hand, we have two testimonies in witness of the fact that, even though a certain crude method of treating diamonds may have lingered in the Orient, the superior European achievements along this line were received by Oriental nations as a surprising novelty. The Armenian *lapidarium* of the seventeenth century states,[1] "No one besides the Franks (Europeans) understands how to polish and to bore the diamond. The polished stone of four carats is sold at ten thousand *otmani*. The Franks at Aleppo say that the diamond, though it is the king of all precious stones, is of no utility without polishing, because in its raw state admixtures will remain, which may often not be noticeable in the cut stone." The Chinese made their first acquaintance with polished diamonds among the Portuguese of Macao, who, they say, base their valuation on this quality.[2]

ACQUAINTANCE OF THE CHINESE WITH THE DIAMOND.— Let us now examine the objections which have been raised by sinologues to the identification of the term *kin-kang* with the diamond. F. PORTER SMITH,[3] who made rather inexact statements on the subject, in 1871 contested that *kin-kang* denotes the real diamond, and treated it under the title "corundum," which arbitrarily he takes for "a kind of adamantine spar." Corundum, he states, crystallizes in six-sided prisms, but the Chinese siliceous stone is said to be octahedral in form. If this be really said by the Chinese, it is evidence that the stone in question is the diamond, not corundum; and the latter, in its main varieties of ruby and sapphire, is well known to the Chinese under a number of terms. Blackish emery, containing iron, it is thought by Smith, is also described

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brought forward for the assertion that the ancients did not employ diamond-dust; but he recruited no new facts for the discussion, and merely referred to the old fable that the Bishop Marbodus (1035–1123) should have been familiar with diamond-dust. MARBODUS, however, in his famous treatise De lapidibus pretiosis, most obviously speaks only of diamond-splinters (huius fragmentis gemmae sculptuntur acutis; in the earliest French translation, dés pieccéttes |Ki en esclatent aguéttes| Les altres gemmes sunt talliées| E gentement aparelliéés.— L. PANNIER, Lapidaires français du moyen âge, p. 36), as translated correctly also by KING (Antique Gems, p. 392); and he does so, not because he was possibly acquainted with them, but because he copied this matter, as most of his data, from Pliny. Likewise KONRAD VON MEGENBERG, in his Book of Nature written 1349–50 (ed. of F. PFEIFFER, p. 433), states only that other hard precious stones are graved with pointed diamond-pieces. It means little, as insisted upon by Sökeland, that A. Hirth and Mariette second the cause of the ancients in the use of diamond-dust, as their opinion is not based on any text to this effect (such does not exist), but merely on the impression received from certain engraved gems. The conclusion, however, that these could not have been worked otherwise than by means of diamond-dust, is unwarranted, and plainly contradicted by Pliny's data regarding the treatment of precious stones.

[1] Russian translation of PATKANOV, p. 4.

[2] *Wu li siao shi*, Ch. 8, p. 22.

[3] Contributions toward the Materia Medica of China, pp. 74, 85.

under this heading in the *Pên ts'ao*. We have seen that what is described in this work, owing to the strict conformity with classical traditions, refers to nothing but the diamond; and it was the black diamonds which were chosen as graving-implements. According to Smith, Cambodja, India, Asia Minor, the country of the Hui-k'i (Uigur), and other countries of Asia, are said to possess this stone. Cambodja is intended for Fu-nan; and the country of the Uigur, as has been shown, is merely the theatre of action for the legend of the Diamond Valley in the version of Chou Mi (this statement is devoid of any geographical value). If the prefecture of Shun-ning in Yün-nan, as stated by Smith, yields the present supply of corundum used in cutting gems, this is an entirely different question. If the name *kin-kang* is bestowed on corundum-points, it is a commercial term, which does not disprove that the *kin-kang* of ancient tradition was the diamond, or prove that it was a kind of corundum. The diamond-points formerly imported were naturally scarce; and the Chinese, recognizing the high usefulness of this implement, were certainly eager to discover a similar material in their country, fit to take the place of the imported article.[1] This is a process which repeated itself in China numerous times: the impetus received from abroad acted as a stimulus to domestic research. If such a stone was ultimately found, it was termed *kin-kang*, not because this stone was confounded with the diamond, but for the natural reason that it was turned to the same use as the diamond-point; in other words, the name in this case does not relate to the stone as a mineralogical species, but to the stone in its function as an implement. Consequently it is inadmissible to draw any scientific inferences from the modern application of the word *kin-kang* as to the character of the stone mentioned in the earlier records of the Chinese.

A. J. C. GEERTS,[2] in his very useful, though occasionally uncritical work, charges the Chinese books with the defect of having constantly confounded the diamond with corundum, adamantine spar, pyrope,

[1] This is proved by the Arabs. The Arabic *lapidarium* of the ninth century, attributed by tradition to Aristotle, demonstrates that Chinese emery was known to the Arabs: the localities where it is found are the islands of the Chinese Sea, and it occurs there as a coarse sand in which are also larger and smaller hard stones (RUSKA, Steinbuch des Aristoteles, p. 151). The Arabs certainly did not confound this Chinese emery with the diamond, nor did the Chinese. This is demonstrated also by Ibn Khordādbeh, who wrote his Book of the Routes and Kingdoms between 844 and 848, and according to whom diamond and emery, the latter for polishing metal, were exported from Ceylon (G. FERRAND, Relations de voyages arabes, persans et turks rel. à l'Extrême-Orient, Vol. I, p. 31). Diamond and emery, accordingly, were distinct matters in the eyes of the Arabs, Ceylonese, and Chinese.

[2] Les produits de la nature japonaise et chinoise, pp. 201–202, 356–358 (Yokohama, 1878, 1883).

almandine, zircon, etc. This list is somewhat extended; and whoever deems its length insufficient may stretch it *ad libitum* under screen of the "etc." A charge of confusion is an easy means of overcoming a difficult subject and setting a valve on serious investigation. It is to be apprehended lest in this case the confusion is rather in the mind of Geerts than in that of the Chinese, and results from his failure to read the Chinese texts with critical eyes. The first conspicuous confusion of Geerts is, that on p. 202 he grants Li Shi-chên the privilege of indicating the true diamond,[1] while this license is abrogated on p. 357: "The place of the *kin-kang* between iron pyrite and aluminous schist is contrary to the idea that this author intended to designate under this name the diamond." What neither Geerts, nor his predecessor Smith, nor his successor de Mély, understood, is the plain fact that Li Shi-chên does not speak at all of the diamond as a stone, but of the diamond-point as an implement. For this reason it is embodied in the chapter on stones, and is logically followed by a discussion of stone needles used in acupuncture. The term "kin-kang stone" means to Li Shi-chên nothing but the diamond-point. The fact that, besides, the diamond was known to the Chinese as a precious stone, is evidenced by the text of the *Tsin k'i kü chu* (p. 35), where the diamond is spoken of as a precious stone (*pao*), and by the *Ko chi king yüan*,[2] where the stone is designated as a "diamond jewel" (*kin-kang pao*) and classed with jade and gems in the chapter on precious objects (*chên pao lei*).[3] It is not necessary to push any further this criticism of Geerts, who hazards other eccentric conclusions in this section. The evidence brought together is overwhelming in demonstrating that the *kin-kang* in the texts offered by Li Shi-chên, and in ancient Chinese tradition generally, is the diamond. This uniform interpretation, inspired by an analysis of all traditions in the known ancient world, instead of an appeal to confusion with a choice of fanciful possibilities, seems to be the best guarantor for the exactness of the result.

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[1] The text referred to is that of Pao-p'u-tse regarding Fu-nan; but it is Li Shi-chên who is made responsible for it by Geerts. This uncritical method of Smith, Geerts, and de Mély, who load everything on to the *Pên ts'ao* or its author Li Shi-chên, without taking the trouble to unravel the various sources quoted by him and to study the traditions with historical criticism, is the principal reason for their failure in reaching positive results.

[2] Ch. 33, p. 3b.

[3] In the great cyclopædia *T'ai p'ing yü lan* (Ch. 813) the notes on the diamond are arranged in the section on metals, being preceded by those on copper and iron. The cyclopædia *T'u shu tsi ch'êng* has adopted the scheme of Li Shi-chên, placing the diamond in the division "stones." It is content to reiterate simply Li Shi-chên's notes, so that this is one of the poorest chapters of this thesaurus.

The solidity and exactness of Chinese tradition is vividly illustrated also by another fact. The term *kin-kang* for the diamond was coined by the Chinese as a free adaptation of the Sanskrit word *vajra*, and, like the latter, signifies with them both the mythical weapon of Indra and the Indian diamond. We noticed that in the oldest historical account of the diamond relative to the year A.D. 277 this precious stone is stated as coming from India, but that at the same time traditions of classical antiquity are blended with this early narrative. Again, the Chinese fully recognized the stone in the diamond-points furnished to them in the channel of trade with the Hellenistic Orient, and were perfectly aware of the fact that diamonds were utilized in the Roman Empire.[1] In the most diverse parts of the world, wherever commercial, diplomatic, or political enterprise carried them, the Chinese observed the diamond, and in every case applied to it correctly the term *kin-kang*. Thus, according to their Annals, the diamond was found among the precious stones peculiar to the culture of Persia under the Sassanians.[2]

Among the early mentions of diamonds is that of diamond finger-rings sent in A.D. 430 as tribute from the kingdom Ho-lo-tan on the Island of Java.[3] In all periods of their history, the Chinese, indeed,

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[1] The *Hüan chung ki* of the fifth century expressly states that diamonds come from (or are produced in) India and Ta Ts'in (*T'ai p'ing yü lan*, Ch. 813, p. 10).

[2] *Pei shi*, Ch. 97, p. 7b; *Wei shu*, Ch. 102, p. 5b; and *Sui shu*, Ch. 83, p. 7b. DIONYSIUS PERIEGETES, who lived at the time of the Emperor Hadrian (117–138), in his poem Orbis descriptio (Verse 318), says that the diamond is found in the proximity of the country of the Agathyrsi residing north of the Istros (Danube); and AMMIANUS MARCELLINUS (XXII, 8; ed. NISARD, p. 175) states that the diamond abounds among this people (Agathyrsi, apud quos adamantis est copia lapidis). BLÜMNER (Technologie, Vol. III, p. 232; and in PAULY'S Realenzyklopädie, Vol. IX, col. 323) infers from these data that the diamond-mines recently rediscovered in the Ural seem to have been known to the ancients; but this conclusion is not forcible. The mines in the Ural began to be opened only from 1829 (the question is not of a rediscovery), and there is no evidence that diamonds were found there at any earlier time. Aside from this fact, a respectable distance separated the Ural from the habitat of the Agathyrsi, who occupied the territory of what is now Siebenbürgen. Already HERODOTUS (IV, 104) knew them as men given to luxury and very fond of wearing gold ornaments. The interesting point is that the Agathyrsi, as shown by JUSTI (Grundriss der iranischen Philologie, Vol. II, p. 442), judging from the remains of their language, belonged to the Scythian stock of peoples, speaking an Iranian language. The notes of Dionysius and Ammianus, therefore, confirm for a Western tribe of this extended family what the Chinese report about Irān proper, and it may be that the diamond was known to all members of the Iranian group in the first centuries of our era.

[3] PELLIOT (*Bull. de l'Ecole française*, Vol. IV, p. 271), who has indicated this passage, sees some difficulties in the term *kin kang chi huan*. While admitting that *kin-kang* is the diamond, he thinks that this translation does not fit the case, and proposes to understand the term in the sense of "rings of rock-crystal." I see no difficulty in assuming that finger-rings of metal set with a diamond are here in question. This passage, indeed, is not the only one to mention diamond rings. In

were familiar with the diamond. To Chao Ju-kua of the Sung period, India was known as a diamond-producing country, though what he relates about the stone is copied from the text of Pao-p'u-tse, quoted above (p. 21).[1]

Judging from Marco Polo's report,[2] the best diamonds of India found their way to the Court of the Great Khan.

The Annals of the Ming record embassies from Lu-mi (Rum) in 1548 and 1554, presenting diamonds among other objects.[3] In the Ming period eight kinds of precious stones were known from Hormuz, the emporium at the entrance of the Persian Gulf; the fifth of these was the diamond.[4] At the same time diamonds were known on Java.[5]

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the year A.D. 428 of the Liu Sung dynasty, the King of Kia-p'i-li (Kapila) in India sent diamond rings to the Chinese Court (*Sung shu*, Ch. 97, p. 4). The *Nan fang i wu chi* (Account of Remarkable Products of Southern China, by Fang Ts'ien-li of the fifth century or earlier: BRETSCHNEIDER, Bot. Sin., pt. 1, No. 544) relates that foreigners are fond of adorning rings with diamonds and wearing these (*T'ai p'ing yü lan*, Ch. 813, p. 10); and Li Shi-chên (above, p. 40) is familiar with diamond finger-rings. The Records of Champa (*Lin yi ki*) relate that the King of Lin-yi (Champa), Fan-ming-ta, presented to the Court diamond finger-rings (*T'u shu tsi ch'êng, Pien i tien* 96, *hui k'ao* 1, p. 11b; or *T'ai p'ing yü lan, l. c.*). Daggers and krisses are set with diamonds in Java, and they are used for inlaying on lance-heads (*Int. Archiv für Ethnographie*, Vol. III, 1890, pp. 94–97, 101). The ancients already employed the diamond as a ring-stone (BLÜMNER, Technologie, Vol. III, p. 232).

[1] HIRTH and ROCKHILL, Chau Ju-kua, p. 111.

[2] Edition of YULE and CORDIER, Vol. II, p. 361.

[3] BRETSCHNEIDER, *China Review*, Vol. V, p. 177.

[4] *Si yang ch'ao kung tien lu*, Ch. C, p. 7 (ed. of *Pie hia chai ts'ung shu*), written in 1520 by Huang Sing-tsêng (regarding this work see Chinese Clay Figures, p. 165, note 3; MAYERS, *China Review*, Vol. III, p. 220; and ROCKHILL, *T'oung Pao*, 1915, p. 76).

[5] *Ibid.*, Ch. A, p. 9.—It is somewhat surprising that the Chinese were not acquainted with the diamonds of Borneo; at least in none of their documents touching their relations with the island is any mention made of the diamonds found there. A good description of the Borneo mines, their sites, working-methods, output, etc., is given by M. E. BOUTAN (Le Diamant, pp. 223–228, with map, Paris, 1886), M. BAUER (Edelsteinkunde, 2d ed., pp. 274–281), and in an article of the Encyclopædie van Nederlandsch-Indië (Vol. I, pp. 445–446). None of these sources, however, bears on the question as to when these mines were opened, or when the first diamonds were discovered, and whether this was done by natives or Europeans. As nearly as I can make out, Borneo diamonds were known in the European market in the latter part of the seventeenth century. In a small anonymous book entitled The History of Jewels, and of the Principal Riches of the East and West, taken from the Relation of Divers of the most Famous Travellers of Our Age (London, 1671, printed by T. N. for Hobart Kemp, at the Sign of the Ship in the Upper Walk of the New Exchange) I find the following: "Let me therefore tell you, that none has been yet able in all the world to discover more than five places, from whence the diamond is brought, viz., two rivers and three mines. The first of the two rivers is in the Isle Borneo, under the equator, on the east of the Chersonesus of Gold, and is called Succadan. The stones fetched from thence are usually clear and of a good water,

STONES OF NOCTURNAL LUMINOSITY.— We noticed that the diamond and the traditions connected with it reached the Chinese chiefly from the Hellenistic Orient. We should therefore be justified in expecting also that the historical texts relative to Ta Ts'in and inserted in the Chinese annals might contain references to this stone; but in Hirth's classical work "China and the Roman Orient," where all these documents are carefully assembled and minutely studied, the diamond is not even mentioned.[1] This, at first sight, is very striking; but it would be permissible to think that the diamond is hidden there under a name not yet recognized as such. In the first principal account of Ta Ts'in embodied in the Annals of the Posterior Han Dynasty,[2] we read that

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and almost all bright and brisk, whereof no other reason can be given, but that they are found at the bottom of a river amongst sand which is pure, and has no mixture, or tincture of other earth, as in other places. These stones are not discovered till after the waters which fall like huge torrents from the mountains, are all passed, and men have much to do to attain them, since few persons go to traffic in this isle; and forasmuch as the inhabitants do fall upon strangers who come ashore, unless it be by a particular favor. Besides that, the Queen does rarely permit any to transport them; and so soon as ever any one hath found one of them they are obliged to bring it to her. Yet for all that they pass up and down, and now and then the Hollanders buy them in Batavia. Some few are found there, but the largest do not exceed five carats, although in the year 1648, there was one to be sold in Batavia of 22 carats. I have made mention of the Queen of Borneo, and not of the King, because that the isle is always commanded by a woman, for that people, who will have no prince but what is legitimate, would not be otherwise assured of the birth of males, but can not doubt of those of the females, who are necessarily of the blood royal on their mother's side, she never marrying, yet having always the command."

[1] India's trade in diamonds with Ta Ts'in, already pointed out, is mentioned in the chapter on India, inserted in the T'ang Annals (Ch. 221 A, p. 10b).

[2] *Hou Han shu*, Ch. 118, p. 4b. Both the night-shining jewel and the moonlight pearl are mentioned together also in the Nestorian inscription of Si-ngan fu and in the Chinese Manichean treatise (CHAVANNES and PELLIOT, Traité manichéen, p. 68). In the latter it is compassion that is likened to the "gem, bright like the moon, which is the first among all jewels." The *T'ung tien* of Tu Yu (written from 766 to 801) ascribes genuine pearls, night-shining and moon-bright gems, to the country of the Pigmies north-west of Sogdiana (*T'ai p'ing yü lan*, Ch. 796, p. 7b). In that fabulous work *Tung ming ki*, which seems to go back to the middle of the sixth century (CHAVANNES and PELLIOT, *l. c.*, p. 145), the Emperor Wu of the Han dynasty is said to have obtained in 102 B.C. a white gem (白珠; the word *chu* means not only "pearl, bead," but also "gems generally"), which the Emperor wrapped up in a piece of brocade. It was as if it reflected the light of the moon, whence it was styled "moon-reflecting gem" (*chao yüe chu;* see *P'ei wên yün fu*, Ch. 7A, p. 107). The *San Ts'in ki*, a book of the fifth century, has on record that in the tumulus of the Emperor Ts'in Shi pearls shining at night (*ye kuang chu*) formed a palace of the sun and moon, and that moonlight pearls (*ming yüe chu*) suspended in the grave emitted light by day and night (*T'u shu tsi ch'êng*, chapter on pearls, *ki shi*, I, p. 3b). The word *p'i* used in the term *ye kuang p'i*, at first sight, is striking, as it refers to a perforated circular jade disk, such as occurs in ancient China (see Jade, p. 154), but does not occur in the Hellenistic Orient. It is therefore probable that the term already pre-existed in China, and was merely transferred to a jewel of the Roman Orient

"the country contains much gold, silver, and rare precious stones, particularly the jewel that shines at night (*ye kuang p'i* 夜光璧), or the 'jewel of noctural luminosity,' and the moonlight pearl (or 'pearl as

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which was reported to the Chinese to shine at night. This holds good also of the term *ming yüe chu*. In *T'oung Pao* (1913, p. 341) and Chinese Clay Figures (p. 151) I pointed out that the two terms are employed as early as the *Shi ki* of Se-ma Ts'ien. The passage occurs in the Biography of Li Se (Ch. 87, p. 2 b), who is ill-famed for the extermination of Confucian literature under the Emperor Ts'in Shi, and who died in 208 B.C. (GILES, Biographical Dictionary, p. 464). In another passage of the same work the two terms "moonlight (or moon-bright) pearl" and "night-shining jade-disk" are coupled together, used in a figurative sense (PÉTILLON, Allusions littéraires, p. 242; LOCKHART, Manual of Chinese Quotations, p. 397). A third passage leaves no doubt of what Se-ma Ts'ien understood by a moonlight pearl. In his chapter treating divination from the tortoise-shell (Ch. 128, p. 2 b), he defines the term thus: "The moonlight pearl is produced in rivers and in the sea, hidden in the oyster-shell, while the water-dragon attacks it. When the sovereign obtains it, he will hold in submission for a long time the foreign tribes residing in the four quarters of the empire." The moonlight pearl, accordingly, was to Se-ma Ts'ien and his contemporaries a river or marine pearl of fine quality, worthy of a king, a foreign origin of it not being necessarily implied. The philosopher Mo Ti or Mo-tse, who seems to have lived after Confucius and before Mêng-tse, mentions the night-shining pearl (*ye kuang chi chu*) in an enumeration of prominent treasures; but I am not convinced of the authenticity of the text published under his name, which was doubtless fabricated by his disciples (compare GRUBE, Geschichte der chinesischen Litteratur, p. 129), and tampered with by subsequent editors. The mention of this pearl in Mo Ti and in other alleged early Taoist writers (compare the questionable text of the *Shi i ki*, quoted by DE GROOT, Religious System of China, Vol. I, p. 278) may be a retrospective interpolation as well. Se-ma Ts'ien must be regarded as the only early author whose references in this case may be relied upon as authentic and contemporaneous. (The uncritical notes of T. DE LACOUPERIE, *Babylonian and Oriental Record*, Vol. VI, 1893, p. 271, with their fantastic comment, are without value.) It seems to me, that, in applying the identical terms to real objects encountered in the Hellenistic Orient, the Chinese named these with reference to that passage of Se-ma Ts'ien by way of a literary allusion, and that for this reason the word *p'i*, in this instance, is not to be accepted literally, as has been done by CHAVANNES (*T'oung Pao*, 1907, p. 181: "l'anneau qui brille pendant la nuit"), but that the term *ye kuang p'i* represents an undivided unit denoting a precious stone. Further, this is corroborated by two facts,— first, that the ancients speak of precious stones, not of rings or disks brilliant at night; and, second, that Yü Huan (220–265), in his *Wei lio*, has altered the term *ye kuang p'i* into *ye kuang chu* ("night-shining pearl or gem") with regard to Ta Ts'in, evidently guided by a correct feeling that this modification would more appropriately conform to the object. Moreover, there are neither in Greek nor in Latin any exact equivalents which might have served as models for the two Chinese expressions; the Chinese, indeed, possessed the latter before coming into contact with the Hellenistic-Roman world; *ye kuang* ("light of the night") is an ancient term to designate the moon, which appears in Huai-nan-tse (SCHLEGEL, Uranographie chinoise, p. 610). This point of terminology, however, must be distinguished from the matter-of-fact problem. Whatever the origin of the Chinese terms may be, from the time of intercourse with Ta Ts'in, they strictly refer to a certain group of gems occupying a conspicuous place in the antique world and deeply impressing the minds of the Chinese. All subsequent Chinese allusions to such gems, even though connected with domestic localities, imply distinct reminiscences of the former indelible experience made in the Hellenistic Orient.

clear as the moon,' *yüe ming chu* 月明珠)." HIRTH[1] and CHAVANNES[2] have united a certain number of classical texts, in order to show that the notion of precious stones, and especially carbuncles, shining at night, was widely propagated in Greek and Roman times; the case, however, deserves a more critical examination. It seems to me, first of all, that a distinction must be made between *ye kuang p'i* and *yüe ming chu*. These two different terms must needs refer to two diverse groups of stones and correspondingly different traditions. It is not difficult to identify the latter of the two, if we examine our Pliny. This is Pliny's *astrion*, of which he says, "Of a like white radiance[3] is the stone called *astrion*, cognate to crystal, and occurring in India and on the littoral of Patalene. In its interior, radiating from the centre, shines a star with the full brilliancy of the moon. Some account for the name by saying that the stone placed opposite to the stars absorbs their refulgence and emits it again."[4] Pliny's "fulgore pleno lunae" appears as the basis for the Chinese term *yüe ming chu* (literally, "moon shining pearl") with reference to this precious stone, as found in the anterior Orient.[5] HIRTH (*l. c.*) refers us to Herodotus (II, 44), who mentions a temple of Hercules at Tyre in Phœnicia with two pillars,— one of pure gold, the other of *smaragdos*, — shining with great brilliancy at night. Hirth takes this *smaragdos* for "emerald stone;" it is certain, however, that the word in this passage does not mean "emerald," but denotes a greenish building-stone of a color similar to the emerald,[6] perhaps, as BLÜMNER[7] is inclined to think, green porphyry. This passage, accordingly, affords no evidence that the Chinese "stone

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[1] China and the Roman Orient, pp. 242–244.

[2] *T'oung Pao*, 1907, p. 181.

[3] With reference to the white stone *asteria*, dealt with in the preceding chapter.

[4] Similiter candida est quae vocatur astrion, crystallo propinqua, in India nascens et in Patalenes litoribus. Huic intus a centro stella lucet fulgore pleno lunae. Quidam causam nominis reddunt quod astris opposita fulgorem rapiat et regerat (XXXVII, 48, § 132).

[5] The much-discussed question as to the stone to be understood by Pliny's *astrion* does not concern us here. The opinion that it is identical with what is now called *asteria* ("star stone") is the most probable one (compare BLÜMNER, Technologie, Vol. III, p. 234). The most detailed study of the subject, not quoted by Krause or Blümner, is that by J. M. GÜTHE, Über den Astrios-Edelstein des Cajus Plinius Secundus (München, 1810). Judging from the recent report of D. B. STERRETT (Gems and Precious Stones in 1913, p. 704, Washington, 1914), this stone seems to become fashionable again in jewelry. Possibly also Pliny's *selenitis* (67, § 181), which has within it a figure of the moon and day by day reflects her various phases, may be sought in the Chinese "moonlight gem," as already supposed by D'HERBELOT (Bibliothèque orientale, Vol. IV, p. 398).

[6] KRAUSE, Pyrgoteles, p. 37.

[7] Technologie, Vol. III, p. 240.

luminous at night" might be the emerald; nor can it be invoked as a contribution to the problem, as the Chinese do not speak of pillars, but of a precious stone. Hirth, further, quotes an account from Pliny contained in his notes on the *smaragdus*. It is difficult to see what relation it is supposed to have with the subject under discussion, as Pliny does not say a word about these stones shining at night. The story runs thus: "They say that on this island above the tomb of a petty king, Hermias, near the fisheries, there was the marble statue of a lion, with eyes of smaragdi set in, flashing their light into the sea with such force that the tunnies were frightened away and fled, till the fishermen, long marvelling at this unusual phenomenon, replaced the stones by others."[1] The plot of Pliny's story is certainly laid in the daytime, not during the night; fishes, as is well known, being attracted at night by luminous phenomena spreading over the surface of the water, and even being caught by the glare of torch-light. At any rate, the passage contains nothing about jewels brightening the night. CHAVANNES, more fortunately, points to LUCIAN (De dea syria), who describes a statue of the Syrian goddess in Hierapolis bearing a gem on her head called *lychnis:* "From this stone flashes a great light in the night-time, so that the whole temple gleams brightly as by the light of myriads of candles, but in the daytime the brightness grows faint; the gem has the likeness of a bright fire."[2] The name *lychnis* is connected with Greek *lychnos* ("a portable lamp"). According to Pliny, the stone is so called from its lustre being heightened by the light of a lamp, when its tints are particularly pleasing.[3] Pliny does not say that the lychnis shines at night,[4] but his definition indicates well how this tradition arose. Pseudo-Callisthenes (II, 42) makes Alexander the Great spear a fish, in whose bowels was found a white stone so brilliant that every one believed it was a lamp. Alexander set it in gold, and used it as a lamp at night.[5] The origin of this trivial story is perspicuous enough.

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[1] Ferunt in ea insula tumulo reguli Hermiae iuxta cetarias marmoreo leoni fuisse inditos oculos e smaragdis ita radiantibus etiam in gurgitem, ut territi thynni refugerent, diu mirantibus novitatem piscatoribus, donec mutavere oculis gemmas (XXXVII, 17, § 66). Compare KRAUSE, Pyrgoteles, p. 38.

[2] H. A. STRONG, The Syrian Goddess, p. 72 (London, 1913).

[3] Ex eodem genere ardentium est lychnis appellata a lucernarum adsensu, tum praecipuae gratiae (XXXVII, 29, § 103). Dionysius Periegetes compares the lychnis with the flame of fire (KRAUSE, *l. c.*, p. 22). Of the various identifications proposed for this stone, that of tourmaline has the greatest likelihood, as Pliny refers to its magnetic property, inasmuch as, when heated or rubbed between the fingers, it will attract chaff and papyrus-fibres.

[4] He does not say so, in fact, with regard to any stone.

[5] It should be noted, however, that in the oldest accessible form of the Romance of Alexander, as critically restored by A. AUSFELD (Der griechische Alexanderroman,

It is welded from two elements,— a reflex of the ring of Polycrates[1] rediscovered in the stomach of a fish, and the tradition underlying the Plinian explanation of the lychnis. It is accordingly the lychnis which, through exaggeration of a tradition inspired by the name, gave rise to a fable of stones luminous at night.[2]

A story of AELIAN[3] merits particular attention: Herakleïs, a virtuous widow of Tarent, nursed a young stork that had broken its leg. The grateful bird, a year after its release, dropped a stone into the woman's lap. Awakening at night, she noticed that the stone spread light and lustre, illuminating the room as though a torch had been brought in. The author adds that it was a very precious stone, without further determination.[4] This story meets with a parallel in a curious anecdote of China, told in the *Shi i ki*, that, when Prince Chao of Yen was once seated on a terrace, black birds with white heads flocked there together, holding in their beaks perfectly resplendent pearls (*tung kuang chu* 洞光珠), measuring one foot all round. These pearls were black as lacquer, and emitted light in the interior of a house to such a degree that even the spirits could not obscure their supernatural essence.[5] Still more striking in its resemblance to Aelian's story is one in the *Sou shên ki:*[6] "The marquis of Sui once encountered a wounded snake, and had it cured by means of drugs. After the lapse of a year [as in Aelian] the snake appeared with a luminous gem in its mouth to repay his kindness. This gem was an inch in diameter, perfectly white, and emitted at night a light of the brightness of the moon, so that the room was lighted as by a torch." The gem was styled "gem of the marquis of

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p. 84), this incident is not contained; it is contained in the uncritical edition of C. MÜLLER of 1846. If AUSFELD (p. 242) is right in placing the primeval text of Pseudo-Callisthenes in the second century B.C., the episode in question, which indubitably is a later interpolation, is not older than the second or third century A.D.

[1] HERODOTUS, III, 41–42.— The stone in this signet-ring, according to HERODOTUS, was a *smaragdos;* according to PLINY (XXXVII, 1), a sardonyx (compare KRAUSE, Pyrgoteles, p. 135).

[2] As a fabulous stone found in the river Hydaspes, the lychnis is mentioned in the unauthentic treatise De fluviis, wrongly ascribed to Plutarch (F. DE MÉLY, Lapidaires grecs, p. 29).

[3] Hist. animalium, VIII, 22.

[4] A. MARX, in his interesting study Griechische Märchen von dankbaren Tieren (p. 52, Stuttgart, 1889), justly comments that the stone mentioned in this tale is the lychnites or lychnis, because, according to Philostratus (Apollonius from Tyana, II, 14), this was the stone placed by the storks in their nests in order to guard them from snakes, and because the lychnis spreads such marvellous light in the dark and possesses many magical virtues (Orphica, 271).

[5] *P'ei wên yün fu*, Ch. 7A, p. 107.

[6] *T'u shu tsi ch'êng*, chapter on pearls, *ki shi*, I, p. 1b.

Sui," "gem of the spiritual snake," or "moonlight pearl."[1] The same Chinese work offers another parallel that is still closer to Aelian, inasmuch as the bird in question is a crane, which would naturally take the place of the stork not occurring in China. "K'uai Ts'an nursed his mother in a most filial manner. There nested on his house a crane, which was shot by men practising archery, and in a wretched condition returned to Ts'an's place. Ts'an nursed the bird and healed its wound, and, the cure being effected, released it. Subsequently it happened one night that cranes arrived before the door of his house. Ts'an seized a torch, and, on examination, noted that a couple of cranes, male and female, had come, carrying in their beaks moon-bright pearls (*ming yüe chu*) to recompense his good deed."[2] The coincidences in these three Chinese versions and the story of the Greek author, even in unimportant details, are so striking, that an historical connection between the two is obvious. The dependence of the Chinese upon the Greek story is evidenced by the feature of the moon-bright pearls, whose actual existence is ascribed by the Chinese to the Hellenistic Orient.[3]

HIRTH has conjectured that the Chinese name "jewel that shines at night" possibly is an allusion to the ancient name *carbunculus*, corresponding to Greek *anthrax* (the ruby). Pliny, however, in the chapter devoted to this stone, has no report about its shining at night. He insists, quite naturally, on its "fire," from which it has received its name, *carbunculus* meaning "a red-hot coal."[4] The only blade of straw to which the above hypothesis might cling may be found in the words quoted by Pliny from Archelaus, who affirmed that these stones indoors appear purple in color; in the open air, however, flaming.[5] What I translate by "indoors" means literally, "when the roof overshadows one." This phrase evidently implies no allusion to a dark room, but is used in the sense of "in the shadow of a house," in opposition to the following open-air inspection of the stones. The only ancient text known to me, that mentions a ruby shining at night (and styled "color of marine purple"), is a small Greek alchemical work

[1] Compare A. FORKE, Lun-hêng, pt. I, p. 378; and PÉTILLON (Allusions littéraires, p. 243), who quotes this story from Huai-nan-tse.

[2] *L. c.*, *ki shi*, I, p. 6b.

[3] In a wider sense this typical story belongs to the cycle of the grateful animals, a favorite subject of the Greeks in the Alexandrian epoch (compare A. MARX, Griechische Märchen von dankbaren Tieren; and F. SUSEMIHL, Geschichte der griechischen Litteratur in der Alexandrinerzeit, Vol. I, p. 856).

[4] Compare THEOPHRASTUS, De lapidibus, 18 (opera ed. WIMMER, p. 343).

[5] Eosdem obumbrante tecto purpureos videri, sub caelo flammeos (XXXVII, 25, § 95).

translated by M. BERTHELOT,[1] which cannot lay claim to great antiquity. For the purpose of identification, tourmaline (*lychnis*), and

[1] Introduction à l'étude de la chimie, p. 272 (Paris, 1889). Not only HIRTH, but also MAYERS (Chinese Reader's Manual, p. 25), T. DE LACOUPERIE (*Babylonian and Oriental Record*, Vol. VI, 1893, p. 274), and CHAVANNES (*T'oung Pao*, 1907, p. 181), without giving reference to any passage, are unanimous in the belief that the carbuncle is the chief night-shining jewel of the ancients. It would be interesting to learn what alleged passage in an ancient author these scholars had in mind. As far as I know, the carbuncle appears as a night-shining stone only in the mineralogical writings of the middle ages, for the first time presumably in the fundamental work De lapidibus pretiosis of MARBODUS (1035–1123), the famous French Bishop of Rennes. In the earliest French translation of his book (L. PANNIER, Lapidaires français du moyen âge, p. 52) the passage runs thus:

"Scherbuncles gette de sei ráis.
Plus ardant piere n'i a máis:
De sa clarté la noit resplent,
Mais le júr n'en fera neiént."

In the famous letter, purported to have been addressed by Prester John to the Byzantine Emperor Manuel, and written about the year 1165, we find the carbuncle mentioned in three passages (57, 90, 93; F. ZARNCKE, Der Priester Johannes I, pp. 91, 95, 96), in the fanciful and extravagant description of the palace of the Royal Presbyter in India: "In extremitatibus vero super culmen palacii sunt duo poma aurea, et in unoquoque sunt duo carbunculi, ut aurum splendeat in die et carbunculi luceant in nocte.— Longitudo unius cuiusque columpnae est LX cubitorum, grossitudo est, quantum duo homines suis ulnis circumcingere possunt, et unaquaeque in suo cacumine habet unum carbunculum adeo magnum, ut est magna amphora, quibus illuminatur palatium ut mundus illuminatur a sole.— Nulla fenestra nec aliquod foramen est ibi, ne claritas carbunculorum et aliorum lapidum claritate serenissimi caeli et solis aliquo modo possit obnubilari." KONRAD VON MEGENBERG (1309–78), in his Book of Nature (ed. of F. PFEIFFER, p. 437), extols the carbuncle as the noblest of all stones, combining all their virtues. Its color is fiery, and it is even more brilliant at night than in the daytime; during the day it is dark, but at night it shines so brightly that night almost becomes day. This belief still prevailed in the seventeenth century, as may be gleaned from the following interesting passage of A. BOETIUS DE BOOT (Gemmarum et lapidum historia, p. 140, ed. of A. Toll, Lugduni Batavorum, 1636): "Magna fama est carbunculi. Is vulgo putatur in tenebris carbonis instar lucere; fortassis quia pyropus, seu anthrax appellatus a veteribus fuit. Verum hactenus nemo unquam vere asserere ausus fuit, se gemmam noctu lucentem vidisse. Garcias ab Horto proregis Indiae medicus refert se allocutum fuisse, qui se vidisse affirmarent. Sed iis fidem non habuit. Ludovicus Vartomannus regem Pegæ tantae magnitudinis, et splendoris habere scribit, ut qui regem in tenebris conspicatus fuerit, eum splendere quasi a Sole illustretur existimet, sed nec ille vidit. Si itaque gemmam noctu lucentem natura producat, ea vere carbunculus fuerit, atque hoc modo ab aliis gemmis distinguetur, omnesque alias dignitate superabit. Multi autumant gemmas in tenebris lucentes, a natura gigni non posse; verum falluntur. Nam ut lignis putridis, nicedulis, halecumque squammis, et animalium oculis, natura lucem dare potest; non video cur gemmis idonea suppeditata materia (in tanta rerum creatarum abundantia) tribuere non possit. An itaque habeatur, aut non, incertum adhuc est. Doctissimorum tamen virorum omnium sententia huiusmodi gemmae non inveniuntur. Hinc fit quod rubentes, et transparentes gemmae omnes; ab iis carbunculi, anthraces, pyropi, et carbones nuncupentur. Quia videlicet carbonis instar lucent, ac ignis instar flammeos hinc inde radios iaciunt."

possibly to a certain extent ruby,[1] remain, while emerald must be discarded.[2]

In my opinion, the diamond should be added to the series. The Chinese, at least in modern times, use the epithet *ye kuang* ("brilliant at night") as a synonyme of the diamond.[3] This notion apparently goes back to an ancient tradition; for the *Nan Yüe chi* ("Description of Southern China")[4] relates that the kingdom of Po-lo-ki 波羅基

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[1] The pilgrim Hüan Tsang (*Ta T'ang si yü ki*, Ch. 11, p. 6; ed. of *Shou shan ko ts'ung shu*) narrates that beside the king's palace was the Buddha's-Tooth Shrine, brightly decorated with jewels. From its roof rose a signal-post, on the top of which was a large ruby (*padmarāga*), which shed a brilliant light, and could be seen shining like a bright star day and night for a great distance (compare WATTERS, On Yuan Chwang's Travels, Vol. II, p. 235; BEAL, Buddhist Records, Vol. II, p. 248; the translation of JULIEN, Mémoires sur les contrées occidentales, Vol. II, p. 32 — "recouvert d'un enduit brillant comme le diamant" — is incorrect, and the whole rendering of the passage is not exact). In view of what is set forth below regarding phosphorescence, it should be remarked right here that any natural phenomenon proceeding from the stone cannot come into question in this case. Moon and star light or artificial illumination of the building must be held responsible for the ruby being visible at night. Thus the causes leading to the conception of stones shining in darkness evidently are different. Also in the case of LUCIAN'S lychnis in the temple of Hierapolis, I am not inclined to believe in a natural phenomenon, but rather in a miracle produced by priestly artifice, which supplied the source of light from a hidden corner, and hypnotized the multitude into the belief that it emanated from the stone. With reference to the above passage of Hüan Tsang, it should be added that COSMAS INDICOPLEUSTES (Christian Topography, translated by MCCRINDLE, p. 365) mentions a gem in the possession of the King of Ceylon (Taprobane), "as large as a great pine-cone, fiery red, and when seen flashing from a distance, especially if the sun's rays are playing around it, being a matchless sight;"but he does not tell of its shining at night. Friar ODORIC OF PORDENONE of the fourteenth century ascribes a similar gem to the King of the Nicobars (YULE, Cathay, new ed., Vol. II, p. 169): "He carrieth also in his hand a certain precious stone called a ruby, a good span in length and breadth, so that when he hath this stone in his hand it shows like a flame of fire. And this, it is said, is the most noble and valuable gem that existeth at this day in the world, and the great emperor of the Tartars of Cathay hath never been able to get it into his possession either by force or by money or by any device whatever."

[2] BECKMANN (Beiträge zur Geschichte der Erfindungen, Vol. III, p. 553) tentatively included among the luminous stones of the ancients also fluor-spar; but, as admitted by himself, the phosphorescent property of this mineral was not recognized before the seventeenth century. Moreover, whatever may have been said to the contrary (BLÜMNER, Technologie, Vol. III, p. 276; and LENZ, *l. c.*, p. 23), it is extremely doubtful to me whether the ancients were acquainted with fluor-spar. This supposition is not well founded on matter-of-fact evidence, but merely inferred from certain properties of the mineral which became known in our own time, and which were subsequently read into certain accounts of the ancients.— Other stones to which the property of nocturnal luminosity is ascribed are purely fabulous, as, for instance, the "stone attracting other stones," described by Philostratus as sparkling at night like fire (F. DE MÉLY, Lapidaires grecs, pp. 27–28).

[3] J. DOOLITTLE, Vocabulary and Handbook of the Chinese Language, Vol. I, p. 132.

[4] Written by Shên Huai-yüan of the fifth century (BRETSCHNEIDER, Bot. Sin., pt. I, No. 559). The text is cited in *T'ai p'ing yü lan*, Ch. 813, p. 10.

produces diamonds, the lustre of which illuminates the dark night. According to Chao Ju-kua,[1] the King of Ceylon possessed a gem five inches in diameter, which could not be consumed by fire, and at night emitted a brilliancy like a torch. As incombustibility was credited to the diamond, this jewel shining at night, in all probability, was a diamond.[2] Another reason why the diamond should be included in this class will be discussed in the following section.

PHOSPHORESCENCE OF PRECIOUS STONES.— As this subject of stones "luminous at night" has heretofore not been properly comprehended by sinologues and others, it may not be amiss to add some explanatory notes.[3] As a matter of fact, of course, stones cannot shine at night: the lustre of any gem is an optical property, and depends upon the effects of light, solar or artificial, which is reflected back to the human eye.[4] The classical and Chinese reports of stones emitting rays of light in darkness, accordingly, have nothing to do with optical phenomena, or, in particular, with so-called "adamantine lustre." If these stories, partially, should refer to a phenomenon of reality, there is but one that can come into question,— that of phosphorescence. This is a property of some gems, which, after rubbing, heating, exposure to light, or an electrical discharge, radiate a light known as phosphorescence; since the glow, although often of different colors, resembles that of phosphorus. This property is particularly exhibited in the diamond, which, on being rubbed with a cloth or across the fibres of a piece of wood, gives out a light plainly visible in a dark room. It is, however, not a general property of all diamonds, but only efficient in certain stones.[5] Though

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[1] *Chu fan chi* (ed. ROCKHILL), Ch. A, p. 10; translation of HIRTH and ROCKHILL, p. 73.

[2] An indirect testimony for the diamond being counted among the night-shining stones in the West may be deduced from the passage in the Physiologus, that the diamond is not found in the daytime, but only at night, which may imply, that, in order to be found at night, it must then emit light (compare F. LAUCHERT, Geschichte des Physiologus, p. 28; E. PETERS, Der griechische Physiologus, p. 96; F. HOMMEL, Aethiopische Übersetzung des Physiologus, p. 77; K. AHRENS, Buch der Naturgegenstände, p. 82).— D'HERBELOT (Bibliothèque orientale, Vol. IV, p. 398) already knew that it was a natural property of the diamond to shine in darkness.

[3] The subject in general has been dealt with by G. F. KUNZ (Curious Lore of Precious Stones, pp. 161–175).

[4] The Chinese scholar Sung Lien (1310–81) had a certain idea thereof. In a Dissertation on Sun, Moon, and Stars (*Ji yüe wu sing lun*) he speaks of a "gem like the full moon" (*yüe man ju chu*), whose substance, in principle, has no lustre; but it borrows its lustre from the sun, that half of it turned away from the sun being constantly dark, and the other half turned toward the sun being constantly bright (*P'ei wên yün fu*, Ch. 7A, p. 109).

[5] Compare FARRINGTON, Gems and Gem Minerals, pp. 34, 70. Among all minerals, phosphorescence is best exhibited by fluorite, nearly all specimens of which,

occurring also in other precious stones, the phosphorescent light is most brilliant and intensified in the diamond; and for this reason it would seem plausible that the diamond should have held the foremost rank among the stones luminous at night.

There remains, however, a grave obstacle in the way of this explanation, which must not be overlooked; and this is that the ancient authors who have written on precious stones are entirely reticent on the subject of their phosphorescent quality. It is indeed taught that this phenomenon was observed for the first time only by the physicist Robert Boyle in 1663.[1] This, of course, does not mean that it was entirely unknown before that time, and that it could not have revealed itself to a layman by a chance accident.

M. BERTHELOT,[2] however, has discovered in the collection of Greek alchemists a small treatise propounding the processes "of coloring the artificial precious stones, emeralds, carbuncles, and hyacinths, after the book drawn from the sanctuary of the temple." He believes that artificial coloring of stones is said in this text to impart to them the property of phosphorescence, and that there is no doubt that the ancients made precious stones phosporescent in darkness through the employment of superficial tinctures derived from substances such as bile of marine animals, the analogous properties of which are known to us. I must confess that this conclusion, though emanating from so high and respectable an authority, for whom I have a profound admiration, is not quite convincing to me. First, it seems open to doubt whether the Greek recipe really took the desired effect, as long as this is not experimentally established; second, if it did, it does not furnish proof that the ancients were acquainted with the phenomenon of the phosphorescence of precious stones, as we understand it, which is a physical property inherent in the stone, while in the Greek text the phosphorescence is alleged to result from animal products brought in contact with the stone, not from the stone itself. The text published by Berthelot, while it may tend to prove that certain ancient alchemists knew something about the phosphorescence of certain animal organs, is not at all apt to show that the same tendency in precious stones was familiar to them; on the contrary, it would be much more likely to have

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when gently heated, will emit a visible light. Its color varies with different varieties, and is usually not the same as the natural color of the mineral. The tints exhibited are usually greenish, bluish, or purplish.

[1] BAUER, Precious Stones, p. 138.

[2] Sur un procédé antique pour rendre les pierres précieuses et les vitrifications phosphorescentes (*Annales de chimie et physique*, 6th series, Vol. XIV, 1888, pp. 429–432); reprinted in his Introduction à l'étude de la chimie, pp. 271–274 (Paris, 1889).

been unknown to them, if that artificial process were ever really applied to stones.

Also from India we receive an intimation as to alleged acquaintance with the fact of phosphorescence before Boyle. The learned Hindu PRAPHULLA CHANDRA RAY,[1] professor of chemistry at the Presidency College, Calcutta, has this to say: "It is sometimes asserted that the phosphorescence of diamond was first observed in 1663 by the celebrated Robert Boyle. Bhoja (eleventh century A.D.), however, mentions this property." Fortunately for us, the Sanskrit text of this passage is added, which reads, "andhakāre ca dīpyate" (translated by Ray, "it phosphoresces in the dark"); but these words simply mean, "it shines in the dark." It is accordingly not the case of Bhoja being familiar with the phosphorescent property of the diamond, but the subjective case of Professor Ray, who knows of Boyle's discovery, and projects this knowledge into his author. It reflects more credit on the well-meant patriotism of the Hindu than on his power of logic. His interpretation being conceded, we could as well infer from the numerous passages of classical and Chinese authors, where precious stones luminous in the dark are spoken of, that also Greeks, Romans, and Chinese possessed an intimate acquaintance with the phenomenon in question.[2] But serious science cannot afford to speed its conclusions up to this rapid tempo; and if the fact remains that no Greek, Roman, Sanskrit, or Chinese text has as yet come to the fore, from which such an inference as to conscious knowledge of the phosphorescence of precious stones can reasonably and without violence be deducted, it is safer to hold judgment in abeyance or to regard the result as negative.[3]

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[1] A History of Hindu Chemistry, Vol. II, p. 40 (2d ed., Calcutta, 1909).

[2] It is noteworthy that neither the Arabic nor the Indian mineralogists have accounts of precious stones luminous at night. What the Arabs offer of this sort is an entirely different affair. The *lapidarium* of Pseudo-Aristotle mentions a fabulous stone under the name "strange stone," which is found in the dark ocean, has rays in its interior, and is visible at night, its veins being brilliant as though they were laughing faces (a corrupted reading which originally was "brilliant like a mirror;" J. RUSKA, Steinbuch des Aristoteles, pp. 20, 167). The "stone bringing sleep" is red, and large pieces of it radiate at night a glow of fire, and in the daytime smoke emanates from it (*ibid.*, p. 166).

[3] In the passage of the Orphica, "the diamond-like crystal, when placed on an altar, sent forth a flame without the aid of fire," KUNZ (Curious Lore of Precious Stones, p. 163) believes he sees an indication that the phosphorescence of the diamond had already been noted before the second or third century of our era; but the plain text does not bear out this far-fetched interpretation. The Greek author has in mind the well-known burning-lenses of crystal, described also by Pliny (see the writer's article on this subject in *T'oung Pao*, 1915, pp. 169–228), and compares their reflective power with that of the diamond; he says nothing further than that the lustre of the diamond vies with that of a crystal lens. There is no allusion to the fact that this happens in darkness, and consequently no reference to phosphorescence.

While direct evidence is lacking, an interesting observation may be based on Pliny, which, it seems to me, is conclusive to some degree; and this is the curious circumstance that Pliny is familiar with the magnetic or electrical property of just those gems which have the best claim to being identified with the stones luminous at night of the Chinese,—tourmaline and diamond. In regard to the former (*lychnis*) he states that these stones, when heated by the sun or rubbed by the fingers, will attract chaff and scraps of papyrus.[1] As to the diamond, he remarks that its hostility toward the magnet goes so far, that, when placed near it, it will not allow of its attracting iron; or if the magnet has already seized the iron, it will itself attract the metal and turn it away from the magnet.[2] The fact is correct that diamond becomes strongly electric on friction, so that it will pick up pieces of paper and other light substances, though it is not a conductor of electricity, differing in this respect from graphite.[3] Whether the diamond, as asserted by Pliny, can check the attractive power of the magnet, seems to be a controversial point. GARCIA AB HORTO was the first to antagonize Pliny's allegation, on the ground of many experiments made by him.[4] C. W. KING[5] has the following observation: "This stone is highly electric, attracting light substances when heated by friction, and, as we have already noticed,[6] has the peculiarity of becoming phospho-

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[1] Has sole excalfactas aut attritu digitorum paleas et chartarum fila ad se rapere (XXXVII, 29, § 103).

[2] Adamas dissidet cum magnete in tantum, ut iuxta positus ferrum non patiatur abstrahi aut, si admotus magnes adprehenderit, rapiat atque auferat (XXXVII, 15, § 61).

[3] "All gems when rubbed upon cloth become, like glass, positively electrified. Gems differ, however, in the length of time during which they will retain an electrical charge. Thus tourmaline and topaz remain electric under favorable conditions for several hours; but diamond loses its electricity within half an hour" (FARRINGTON, Gems and Gem Minerals, pp. 34, 70). The Arabs attribute to the garnet (*bijādī*) the power of attracting wood and straw (J. RUSKA, Steinbuch des Aristoteles, p. 144). I do not believe with Ruska that this statement may be caused by confusing the garnet with amber. Though Vullers and Steingass, in their Persian Dictionaries, assign to the word *bijādī* or *bejād* the meanings "garnet" and "amber," the latter interpretation is evidently suggested by the reference to the attractive power.

[4] Nè meno è il vero che tolga la virtù alla calamita di tirare il ferro; percioche ne ho fatto io molte volte esperienza, e l'ho trovata favola (Italian edition of 1582, p. 182).

[5] Antique Gems, p. 71.

[6] In the passage referred to (p. 27) KING says that "the property of phosphorescence is possessed by no other gem except the diamond, and this only retains it for a few minutes after having been exposed to a hot sun and then immediately carried into a dark room. This singular quality must often have attracted the notice of Orientals on entering their gloomy chambers after exposure to their blazing sun, and thus have afforded sufficient foundation to the wonderful tales built upon the simple

rescent in the dark after long exposure to the sun. The ancients also ascribed magnetic powers to the diamond in even a greater degree than to the loadstone, so much so that they believed the latter was totally deprived of this quality in the presence of the diamond; but this notion is quite ungrounded. Their sole idea of magnetism was the property of attraction; therefore seeing that the diamond possessed this for light objects, the step to ascribing to it a superiority in this as in all other respects over the loadstone was an easy one for their lively imaginations." Ajasson, however, holds that if the diamond is placed in the magnetic line or current of the loadstone, it attracts iron equally with the loadstone, and consequently neutralizes the attractive power of the loadstone in a considerable degree.[1] Be this as it may, Pliny, at any rate, was well informed on the electrical quality of the diamond; and if this experiment in the case of diamond and tourmaline was brought about by rubbing the stones, it is not impossible that in this manner also a phosphorescence was occasionally produced and observed. A few such observations may easily have given rise to fabulous exaggerations of stones illumining the night.

Were phosphorescent phenomena known to the Chinese? First of all, they were known in that subconscious and elementary form in which we find such conceptions in the domain of our own folk-lore. The philosopher Huai-nan-tse of the second century B.C. says that old *huai* trees (*Sophora japonica*) produce fire, and that blood preserved for a long time produces a phenomenon called *lin* 燐.[2] This word is justly assigned the meaning "flitting light" and "will-o'-the-wisp, as seen over battle-fields." It is defined in the ancient dictionary *Shuo wên* as proceeding from the dead bodies of soldiers and the blood of cattle and horses, popularly styled "fires of the departed souls."[3] The philosopher Wang Ch'ung of the first century A.D. criticised this belief of his contemporaries as follows: "When a man has died on a battle-field, they say that his blood becomes a will-o'-the-wisp. The blood is the vital force of the living. The will-o'-the-wisp seen by people while walking at night has no human form; it is desultory and

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fact by their luxuriant imaginations." I am somewhat inclined toward the same opinion; but we should not lose sight of the fact that the phenomenon itself, as far as precious stones are concerned, is not described in any ancient record, while we may trust to the future that such will turn up some day in a Greek papyrus. As the matter stands at present, we have at the best a theory founded on circumstantial evidence deduced from the ancients' knowledge of the magnetic property of precious stones.

[1] BOSTOCK and RILEY, Natural History of Pliny, Vol. VI, p. 408.

[2] Quoted under this word in K'ang-hi's Dictionary.

[3] The text is cited in COUVREUR's Dictionnaire chinois-français, p. 496.

concentrated like a light. Though being the blood of a dead man, it does not resemble a human shape in form. How, then, could a man whose vital force is gone, still appear with a human body?"[1] At the present day, when the Chinese in a very creditable manner coined a nomenclature to render our scientific terminology, they chose this word *lin* (ignis fatuus) to express our term "phosphorescence."[2] This shows that they have a feeling that this phenomenon underlies the popular notions conveyed by their word.[3]

The *Po wu chi* by Chang Hua (232–300)[4] has the following interesting text, which shows also that the Chinese had a certain experience of electric phenomena: "On battle-fields the blood of fallen men and horses accumulates and is transformed into will-o'-the-wisps. These adhere to the soil and to plants like dewdrops, and generally are not visible. Wanderers sometimes strike against them, and they cling to their bodies, emitting light. On being wiped off, they are scattered around into numberless particles, which yield a crepitating sound, as though beans were being roasted. They thrive only in quiet places for any length of time, and may soon be extinguished. The people affected by them become perturbed, as though they were mentally unbalanced, and remain for some days in an erratic state of mind. At present when people comb their hair, or are engaged in dressing or undressing, sparks may be noticed along the line of the comb or the folds of the dress, also accompanied by a crepitating sound."[5]

We noticed above that the phosphorescing of certain organs of marine animals was known to Greek alchemists. The counterpart of this observation is found in Chinese accounts of the eyes of whales, especially those of female whales, making "moonlight pearls" (*ming*

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[1] A. FORKE, Lun-hêng, pt. I, p. 193.

[2] It appears from the *Ku kin chu* of Ts'uei Pao of the fourth century (Ch. B, p. 6b; ed. of *Han Wei ts'ung shu*) that the phosphorescence of the glow-worm or firefly was styled also *lin* and likewise *ye kuang* ("wild fire," or "fire of the wilderness").

[3] GILES (No. 6717) assigns this significance also to the word *lan* in the compound *yü lan* ("phosphorescence of fishes").

[4] Compare Notes on Turquois, p. 22. The passage is in Ch. 9, p. 2, of the Wu-ch'ang edition.

[5] Also in Japan it was believed that will-o'-the-wisps represent the souls of people (hence called *hito-dama*, "man's soul"), which are floating away over the eaves and roof as a transparent globe of impalpable essence (ASTON, Shinto, p. 50; M. REVON, Le Shintoisme, pp. 111, 302). Interesting information on this subject relative to Japan is given by GEERTS (Les produits de la nature japonaise et chinoise, pp. 186–187). Compare also some notes of M. W. DE VISSER (The Dragon in China and Japan, pp. 213–214); and the same author's detailed study Fire and Ignes Fatui in China and Japan (*Mitteilungen des Seminars für oriental. Sprachen*, Vol. XVII, pt. I, 1914, pp. 97–193).

yüe chu);[1] this was recorded by Ts'uei Pao in the middle of the fourth century.[2] The fact that this was not mere fancy, but that such whale-eye pearls were a product of actual use, is illustrated by the Moho, a Tungusian tribe of the Sungari, who sent these in the year 719 as tribute to the Chinese Court.[3] The fabulous work *Shu i ki* says that in the southern sea there is a pearl which is the pupil from the eye of a whale, and in which one may behold his reflection at night, whence it is called "brilliancy of the night" (*ye kuang*).[4] Varāhamihira (A.D. 505–587), in his Bṛihat-Saṁhitā (Ch. 81, § 23), speaks of a pearl coming from dolphins, resembling the eye of a fish, highly purifying, and of great worth.[5]

Fish-eyes seem to have been enlisted for this purpose in old Japan. The Annals of the Sui Dynasty[6] attribute to Japan a wishing-jewel (*ju i pao chu*, rendering of Sanskrit *cintāmaṇi*) of dark color, as big as a fowl's egg, and radiating at night, said to be the pupil of a fish-eye.[7]

Of other substances of animal origin credited by the Chinese with the property of nocturnal luminosity may be mentioned rhinoceros-horn, discussed by the writer on a former occasion.[8] While at that time I referred the earliest conception of this matter to Ko Hung of the fourth century and to a work of the T'ang period, I am now in a position to trace it to an author of the third century A.D., Wan Chên, who wrote the work *Nan chou i wu chi* ("Account of Remarkable Objects in the Southern Provinces").[9] This writer assumes the existence of a divine or spiritual rhinoceros, whose horn emits a dazzling splendor. The interesting point, however, is that it is just an ordinary horn when examined in the daytime, whereas in the darkness of night the single veins of the horn are effulgent like a torch.[10] In regard to exhibiting luminous properties at night, instances of the real pearl, which is likewise

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[1] The same term as that ascribed to the Hellenistic Orient and identified above with the *astrion* of Pliny.

[2] The complete text is given by the writer in *T'oung Pao*, 1913, p. 341.

[3] *T'ang shu*, Ch. 219, p. 6.

[4] *P'ei wên yün fu*, Ch. 7A, p. 107; or Ch. 22A, p. 76b. This attribute again is identical with that conferred on the precious stone of the Hellenistic Orient.

[5] H. KERN, Verspreide Geschriften, p. 100 ('s-Gravenhage, 1914).

[6] *Sui shu*, Ch. 81, p. 7.

[7] In all probability this jewel was a Buddhist relic brought over to Japan from India. Reference has been made above (p. 22) to the Buddhist legend, according to which the *cintāmaṇi* originates from the fabulous fish *makara*. The Chinese author Lu Tien (1042–1102), in his *P'i ya*, expresses the view that the *cintāmaṇi* is the pupil of the eye of a fish (*Wu li siao shi*, Ch. 7, p. 13).

[8] Chinese Clay Figures, pp. 138, 151.

[9] BRETSCHNEIDER, Bot. Sin., pt. 1, Nos. 452, 539; and *Sui shu*, Ch. 33, p. 10.

[10] The passage is quoted in the cyclopædia *T'ai p'ing yü lan* (published by Li Fang in 983), Ch. 890, p. 3 (edition of Juan Yüan, 1812).

an animal product, have already been cited (p. 56). A few more cases may here be added. In A.D. 86 moonlight pearls as big as fowl's eggs, 4.8 inches in circumference, were produced in Yü-chang and Hai-hun.[1] In the work *Kuang chi*, by Kuo I-kung of the sixth century,[2] are distinguished three kinds of pearl-like gems,— the gem *mu-nan* 木難 of yellow color,[3] the bright gem (*ming chu* 明珠), and the large gem resplendent at night (*ye kuang ta chu* 夜光大珠), all an inch in diameter, or two inches in circumference, the best qualities coming from Huang-chi;[4] these are perfectly round, and when placed on a plane do not stop rolling for a whole day.[5]

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[1] Both localities are situated in the prefecture of Nan-ch'ang, Kiang-si Province. This notice is given in the *Ku kin chu* of Ts'uei Pao (fourth century), cited in *T'ai p'ing yü lan*, Ch. 803, p. 6.

[2] BRETSCHNEIDER, Bot. Sin., pt. 1, No. 376; and PELLIOT, *Bull. de l'Ecole française*, Vol. IV, p. 172.

[3] In another passage of the same work (cited in *P'ei wên yün fu*, Ch. 7A, p. 107; and *T'ai p'ing yü lan*, Ch. 809, p. 4b) it is said that this gem of yellow hue originates in the eastern countries. In this case, the name for the gem is *mo-nan* 莫難, which appears to be a phonetic variant of *mu-nan*. The same form is found in the *Ku kin chu* (Ch. c, p. 5b; ed. of *Han Wei ts'ung shu*), where *shui* 水 *nan* is given as a synonyme, and where it is remarked that the stone is yellow and occurs in the countries of the Eastern Barbarians. Aside from these indications placing the home of the stone vaguely in the East, we have other accounts that attribute it to the Hellenistic Orient. The *Nan Yüe chi* (by Shên Huai-yüan of the fifth century; quoted in *P'ei wên yün fu*, Ch. 7A, p. 102b) states that *mu-nan* are pearls or beads of greenish color, produced by the saliva of a bird with golden wings, and that they are prized in the country of Ta Ts'in. The *Hüan chung ki* (*T'ai p'ing yü lan*, *l. c.*) likewise informs us that Ta Ts'in is the place of production. The Annals of the T'ang Dynasty ascribe *mu-nan* to Fu-lin (HIRTH, China and the Roman Orient, p. 59); and Ma Tuan-lin explains them as evolved from the coagulated saliva of a bird (*ibid.*, p. 80),— doubtless the echo of a Western tradition. The *Shi i ki* tells of an auspicious bird living on the fabulous isle Ying-chou, and spitting manifold pearls when singing and moving its wings. An exact description of the stone *mu-nan* is not on record. The *Pên ts'ao kang mu* lists it among the precious stones of yellow color. Yang Shên (1488–1559) identifies it with the emerald (written by him *tsie-ma-lu* instead of *tsie-mu-lu*, see Notes on Turquois, p. 55). Fang I-chi, in his *Wu li siao shi* (Ch. 7, p. 14), proposes to regard it as the yellow *yakut* of the Arabs. These speculations are recent after-thoughts of doubtful value.

[4] Regarding the location of this country see Chinese Clay Figures, p. 80.

[5] *T'u shu tsi ch'êng*, chapter on pearls, *hui k'ao*, 1, p. 6b. The latter statement reminds one of Pigafetta's account regarding the two pearls of the King of Brunei (west coast of Borneo), as large as hen's eggs, and so perfectly round that if placed on a smooth table they cannot be made to stand still (see HIRTH and ROCKHILL, Chau Ju-kua, p. 159).— Li Shi-chên speaks of "thunder-beads" dropping from the jaws of a divine dragon and lighting an entire house at night (see Jade, p. 64). These are certainly not on a par with the other "prehistoric" implements enumerated by him in the same text, as believed by DE VISSER (The Dragon, p. 88), but this matter has crept in here by way of wrong analogy. These alleged thunder-beads are simply a transformation of the snake-pearls of Indian folk-lore.

Also coral has been credited with the same property. The work *Si king tsa ki* ("Miscellaneous Records of the Western Capital," that is, Si-ngan fu) relates: "In the pond Tsi-ts'ui there are coral-trees twelve feet high. Each trunk produces three stems, which send forth 426 branches. These had been presented by Chao T'o, King of Nan Yüe (Annam), and were styled 'beacon-fire trees.' At night they emitted a brilliant light as though they would go up in flames."[1]

Whether in each of the instances cited the case rests on real observation is difficult to decide. Some accounts may be purely fabulous or imaginary, and the luminous property may have freely been transposed from one substance to another. Taken all together, however, we cannot deny that certain phenomena of phosphorescence might to a certain degree have been known to the ancient Chinese in some way or other, although the phenomenon itself was not intelligently understood. A recent author, Sung Ying-sing, who wrote in 1628 (2d ed., 1637) the *T'ien kung k'ai wu*, a treatise on technology, gives an interesting account of the pearl-fishery, and discredits the belief in night-shining pearls. He remarks, "The pearls styled 'moonlight and night-shining' in times of old are those which, when viewed under the eaves in broad daylight on a sunny day, exhibit a fine thread of flashing light; it is uncertain, however, that the night-shining pearls are finest, for it is not true that there are pearls emitting light at the hour of the dusk or night." There is, however, no account on record to show that the Chinese ever understood how to render precious stones phosphorescent; and since this experiment is difficult, there is hardly reason to believe that they should ever have attempted it. Altogether we have to regard the traditions about gems luminous at night, not as the result of scientific effort, but as folk-lore connecting the Orient with the Occident, Chinese society with the Hellenistic world.

[1] *T'ai p'ing yü lan*, Ch. 807, p. 5; or *T'u shu tsi ch'êng*, chapter on coral, *ki shi*, p. 1 (see also *Pien i tien* 94, Annam, *hui k'ao* VI, p. 8 b, where this event is referred to the beginning of the Han dynasty).

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