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OF GREAT BRITAIN
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EXAMINER'S REWARDS

By B. W. ANDERSON

AN examiner's job has this in common with child-bearing, that a year elapses between each experience, during which interval the worst aspects of the ordeal have been forgotten, enabling one to gather enough determination to go through with the labour all over again.

The marking of some hundreds of exam papers can in fact be a very tedious as well as a very responsible task. By the nature of things most of the answers are humdrum and repetitive, and marks well-earned are hard to find. In general, only two types of paper can give the examiner pleasure, and these lie at the top and at the bottom of the order of merit. From answers in the top grade one derives a legitimate satisfaction in seeing the questions answered in a manner that shows a real understanding of the subject, and even, perhaps, some sense of the style in which an answer should be framed. From answers in the lower strata of the pile come the "howlers", and just a few of these can be really amusing, and serve to provide the examiner's "rewards" referred to in the title of this article.

There is nothing funny, of course, in mistakes as such—the effect of which, in fact, can be saddening if one cares for the success in training young jewellers in the elements of gemmology; but there are some purely accidental turns of phrase or mis-choice of words, which seem too good to lose for ever in the waste-paper baskets of time. The writer has collected a number of these over the years,

and hopes that in reproducing some of them here he may share his pleasure with other readers of this *Journal* who have a like taste for the flavour of the ridiculous.

In carrying out this task two things are essential. One is, that the student's words should be reported accurately in each case, with nothing altered or added in any way for the sake of making the quotation more amusing. The other is, that the contributions should be completely anonymous, and can thus cause no hurt feelings for the students concerned. Both these conditions are observed scrupulously in what follows: the names of students are in any case not known to the examiners—they remain a "number" only: and since the excerpts quoted mostly date from the rather remote past it is hardly conceivable that any of the innocent contributors should remember having written any of the words quoted.

The most perfect example I know was passed to me by one of my co-examiners, Mr. J. R. H. Chisholm. This involves merely the misplacement of a hyphen for its effect. The student was dealing with the precautions to be taken when carrying out a hydrostatic density determination in water, and in the course of his answer recommended the removal of air-bubbles clinging to the stone "by means of a camel's hair-brush".

Spelling mistakes are not often funny, though they may make one marvel at the inadequacy of modern education. In one answer on synthetics no fewer than seven wrong variations on the name of the inventor of flame-fusion were encountered: Vernueil, Vernuile, Vernail, Verneil, Veullein, Veruil, Verneuill. The most common mistake in any technical word is undoubtedly the use of "flourescence" in place of fluorescence. In one partial count I made, those in error amounted to 50% of the total. One feels that teachers are partly to blame in such a case for perhaps not making the derivation of the term sufficiently clear. Possibly the worst example, since only simple words were involved, came in the description of garnets, which were said to be "mostly deap read in colour". A spelling error on one occasion gave rise to the sexiest answer I have yet encountered, written years before the permissive society took over. This was the suggestion that, in testing for a radium-treated diamond, it should be "raped in black paper with photographic film".

More liable to be amusing are examples of malapropism, of

which here are a few picked from the many I have noted through the years:

"Ivory is animal dentures in many forms". "Amethysts are in high command". "Important diamond mines include the Jonker and the Westphal". "Synthetic beryl is manufactured by a hydrothermal conclave bomb". "Zircon often generates to a state of low zircon which is sometimes almost anomalous". "Zircon has a subadalmandine lustre". . . . and talking of zircon still, "Absorption lines in zircon are due to presents of uranium", and "Zircon is a stone which appears to be changing its state at the present time. This is no doubt due to variations of temperature at the earth's surface".

Two pleasing notes on the term "Lauegram": "The Lauegram is of course a very costly and complicated instrument, and is only found in the very best equipped laboratories" (according to one student), while another seemed to be indulging in a little joke when he wrote (on pearl testing) "The Lauegram is another method for distinguishing and gives a spotted pattern on a photographic plate. Very often, however cultured pearls can be spotted without the aid of these machines".

Chemistry often causes trouble. "Turquoise is a complication phosphate". "The closest imitation of amber is cobalt resin". "Pyrope can become different by iron creeping into the formula" while (a very nice piece of knowledge) "Zircon shows traces of the rare element zirconium", morevoer it "turns blue in a decreasing atmosphere". "Lapis Lazuli is a copper and iron sulphate; when viewed the copper can be seen embedded" while (a pathetic thought) "Imitation lapis is produced by dying agates and other poor cherts".

A question on what are the three states of matter brought forth some interesting suggestions: (1) Animal, vegetable, mineral; (2) Igneous, metamorphic, sedimentary; (3) Beauty, durability, and rarity; (4) Crystalline, cryptocrystalline, amorphous; (5) Oxygen, hydrogen, and water; while yet another student described a typical 3-phase inclusion as being "spiked shaped inclusions in groups of three", illustrating his answer with what looked like a series of rather shaggy pawnbroker's signs.

Explaining isomorphism caused some difficulty: one felt that

students had a rough idea of what it meant, but not clearly enough to put it into words. "Isomorphism is a property a gemstone has to have a different chemical composition and physical properties to those which are layed down to it" was one attempt, while another candidate made the whole thing sound slightly indecent: "The garnet family of gemstones are very inconstant due to isomorphous replacement. They all tend to border with one another or overlap". One feels that in flagrant cases they might even be prosecuted, and charged with "bordering and overlapping".

Frank confessions of ignorance are often rather appealing, as in the answer "The colouring matter of emerald has been forgotten, but the writer does not think it is manganese", while one sympathizes with an unfortunate overseas student who had obviously been cramming for dear life, and broke down in mid-stream, with the remark "I have learned too much too quickly, and can no more think of nothing at all".

It is difficult to stop quoting from the many more examples in my note-books, but one does not want to overdo the business. One student notion, however, that the singular of *specimen* must clearly be *speciman* deserves mention before concluding. I can only hope that, thanks to this article, a sprinkling of the best of these student's sayings may be saved for posterity, where otherwise they must certainly have been lost forever.

THE ST. MICHAEL GOBLET

By H. TILLANDER

IN the Museum of Fine Arts in Vienna, a historical goblet is preserved, one about which practically nothing is known. It is made of chased gold and exceptionally richly jewelled. The overall height is 20½ inches (51·7 cm). The name is apparently derived from the sculpture on top of the lid, the Archangel Michael as the dragon's conqueror. The origin of the cup is supposed to be French and the date of manufacture between 1530 and 1540.

There is nothing very special about the goblet itself, but the gems are much more interesting. And among the gems the diamonds are well worth a detailed description. They seem to have been taken from a stock of early 15th century diamonds or, if of later date, they are cut in the same styles and with the same methods as the earliest-known fashioned diamonds. In any case they illustrate extremely well types of design known since the 14th century.

I. Point-cut

There is one point-cut on the stem of the goblet. It was not possible to determine to what extent it had been transformed from the original rough, but it was most interesting to note that this diamond had been placed in the setting in a very original position. One of the octahedral faces forms the "table" and the one directly opposite is the "culet". In other words it has been turned in a manner such as an octahedron would lie on a desk. The setting being very deep, all that is visible to the eye is the "table" and three surrounding half-moon-shaped "main-facets". In Figure 1 the stone is exposed and no parts are hidden by the setting.

Another example of point-cut diamonds set in the same way is in the contemporary drawing (now in the Historical Museum of Basle, Switzerland) of the gold aigrette looted from the tent of the Duke of Burgundy at Grandson in 1476.

II. Tablet-cut

Eight very fine and well-proportioned tablet-cut diamonds are spread all over the goblet. They all have the typically large tables, very low crowns, but beautifully proportioned pavilions and rather

small culets. None of them is thus anything like portrait-cuts or classical tablet-cuts. To the more detailed description of the tablet-cut given in the earlier description of the Burgundian Court Goblet may now be added the latest results of my experiments and researches. The ideal angles for the crown and above all the pavilion is 45°, a magical figure throughout the earlier history of diamond cutting. A square and an elongated tablet is shown in Figures 2 and 3.

III. Six-facet calf's-head-cut

On the chest of the cast figure of the angel (Figure 4), the outline and faceting of a calf's-head can be seen. Around a central apex there are six main facets in the crown, and at both ends in addition a tiny girdle facet. This diamond is not a rose-cut, since a detailed study disclosed a pavilion with four main facets meeting in a short facet edge. All of these facets are four-sided.

The name for this shape was taken from the G.I.A. Diamond Dictionary.

IV. Coxcomb-cut

In the centre of Figure 4 is a shape which, according to old French inventories, was frequently used between 1400 and 1450. The term used then was "Un Dyament Taillé en Façon de creste de coq" and in all probability derived from an ornament, usually worn on top of a helmet since the beginning of the 13th century.

Such fancy cuts during the period were used for diamonds of all sizes—including quite large stones—but for obvious reasons only small ones, never worth recutting, have been preserved. These are mostly encountered in human figures, like the one in the goblet.

At least this specimen has a flat base and could thus in modern English be called a trapeze-shaped bar-cut rose-diamond.

V. Drop-shaped rose-cut

There are several diamonds of this type in the angel (Figure 4). One of them has four facets only, the others have six. Even though I have classed these shapes as rose-cuts, their crown facets do not meet in a point, but in a short, vertically placed facet edge, which thus forms the apex of the rose-diamond.

FIG. 1
Point-cut

FIG. 4
The Archangel

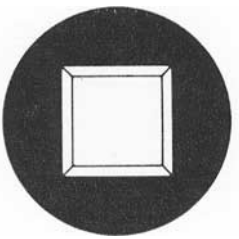

FIG. 2
Tablet-cut

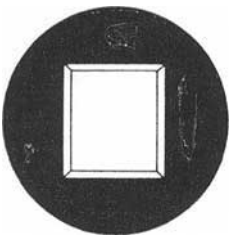

FIG. 3
Tablet-cut

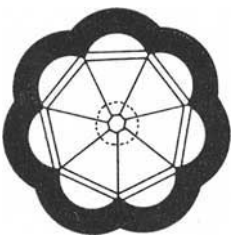

FIG. 5
The Sepaloid-cut

VI. Three-facet baguette-cut

Seven diamonds of this type can be seen in the angel (Figure 4). Four of them are more or less tapered, much like the modern tapered baguette, two are trapeze-shaped and one has the outline of a kite. All of these seem to have flat bases, but similar diamonds in other objects from the same period have been encountered with pavilions. I feel all these belong to the same category, since the purpose of these shapes was merely decorative and there was certainly no definite rule for height proportions.

VII. Sepaloid-cut

This is a provisional name for a shape of diamond, which is rarely, if ever used, but in combination of several stones in one setting. It indicates that in more intricate patterns a row or rather a circle of such stones is placed in the periphery of a flower-like composition and thus plays the part of sepal leaves. The 12 diamond-flowers in the St. Michael Goblet are of the less complicated type, composed of "sepals" only. This is probably the earliest version of these flowers, or "forget-me-nots" or "rosettes" as they also have been called in French and German. Some of the flowers in this goblet are composed of five, some of six and some of as many as seven individual sepaloid-cut diamonds. Figure 5 shows the richest variety with the dotted circle indicating the central pin, the "pistil" which holds the diamonds in position at the centre. In this particular object the "pistils" are golden knobs, but in rings and pendants they are usually set with an emerald or other coloured gemstone. There is rarely a setting between the diamonds. For that reason they must be very precisely shaped. The box into which the stones are assembled is however filled with black tar, into which they are placed. This could be seen through the narrow slits between the diamonds in a pendant from Dresden and in an object in Munich where one stone was missing. At the blunt end of the stones they are kept in place by golden setting, which is shaped to resemble the stamen of a flower.

The ideal shape of rough diamonds from which the sepaloid-cuts were produced must have been octahedra cleaved into two equal halves, but in the majority of flowers, the diamonds are thinner, which indicates that any type of flats, maccles, glassies or

St. Michael Goblet, Kunsthistorisches Museum, Vienna

similar rough that was not suitable for fine tablet-cuts was shaped into sepaloid-cuts. A substantial amount of labour must have been involved in many cases, since the demand must have exceeded the supply of ideal shapes of rough available. Diamond flowers were in vogue for about a century and a half and many hundreds of them have been registered by the author of this article. In all probability some cutters must have specialized in these shapes, since so far it has not been possible to find one capable of or interested in producing a replica of this cut.

The outline of a sepaloid-cut is fan-shaped with the broader end distinctly rounded. There are three facets in the crown, one half-moon-shaped and one triangular. These are divided by a usually extremely narrow trapeze-shaped flattened facet edge. It meets exactly the corresponding edges of the neighbouring stones in the flower and all together form an attractive frame around the figure formed by the central triangular facets. The entire combination resembles to some extent the modern brilliant-cut, although it is a composition of several small diamonds.

The reason why these flowers were produced, is no doubt a desire for effect. Large diamonds were extremely rare in the western world during the 15th and 16th centuries and therefore "clusters" of some kind had to be created. The design in itself was not new, in fact a favourite pattern from centuries before, and for that reason immediately accepted.

As a conclusion it may be said, that diamond flowers, such as they were executed during this relatively short period, are among the finest combinations of gems ever produced. They have a charm never achieved in more recent times and would be well worth a revival, if it is at all possible.

A NEW LOOK AT RARE GEMS

By GORDON V. AXON

RARE gems fall into several categories. Some, such as ruby, emerald, alexandrite, and hiddenite, are rare, in fine quality, because the colouring chemical element is not too often found with the basic mineral.

Other gems are rare, or fairly rare, as the mineral is difficult to cut. These include crocoite, vivianite, and wulfenite. Cerussite is common enough, but the mineral is usually colourless, and very heat-sensitive to cutting, so cut cerussites are not too common. Kyanite produces beautiful gems, but flawless stones of fine green or blue are not often met with.

Many minerals, usually opaque, rarely produce faceting material. These include cancrinite, dumortierite, diaspore, hypersthene, lazulite, microlite, magnesite, sodalite, zincite, natrolite, hauynite, cuprite, staurolite, rhodonite, bustamite, and prehnite.

Some minerals are rare in particular hues. Apatite is not too uncommon, but red and violet apatites are rare gems. So are green and blue euclase, colourless benitoite, blue scapolite, and yellow scapolite cat's-eye. Colourless tourmaline and colourless spinel likewise are never commonly met with, possibly because of little trade interest but basically from true rarity.

Such minerals as rhodizite, simpsonite, and greenockite are never likely to produce large gems. Most collectors would be glad to have a small one of each.

Some gems get mentioned in gem textbooks, while others do not. Dickinsonite has produced small olive-green stones, but is seldom read about. Pyroxmangite produces small red stones and manages to get listed. Perhaps the colour makes a difference.

The tantalite series remains a rare group, although each specific mineral has probably produced gems of two carats or so at one time or another.

Collectors are sometimes struck by the sheer difficulty of obtaining gems that are casually dismissed in textbooks, while finding supposedly rare gems quite easy to obtain. Quite often, the material is there, but is hardly worth collecting. Quincite may so qualify. Lumachelle can hardly be collected from an

abandoned mine, while true odontolite is seldom seen. A major source of fine proustite crystals is now abandoned. Violane hardly ever comes on the market, while cyprine and hodgkinsonite are even scarcer.

Yet the last ten years have seen many rare gems become moderately easy to obtain. Kunzite, once a rarity, glutted the market some years ago, but is now regaining status. Andalusite is never common, but can hardly qualify as truly rare. Amblygonite and axinite, once luckily obtained in one carat stones, have been found in comparatively large crystals of good cutting quality. Colourless euclase has made its way into many collections recently from the quite large find of crystals of good cutting quality and decent size. Natrolite, once regarded as almost impossible to cut, has been found in chunky crystals that yield properly shaped gems. Petalite, too, has been seen in sizes regarded as almost unbelievable some years ago. Even so, petalite is still quite elusive. Sphene, once very rare in fine quality and colour, became fairly common some years ago but now seems on its way back to rarity.

Of course, many more exist. Opinions vary among collectors, depending often on luck, on what gems truly are rare. Augelite, pollucite, painite, beryllonite, taaffeite, fibrolite, hambergite, magnesite, siderite, scheelite, staurolite, willemite, and clear tremolite, probably would qualify as rare gems for most collectors.

Perhaps the lesson of the last ten years is the simple one that conditions are constantly changing, that some rare gems become fairly common, while others seem to disappear. The earth, as we know from the incredible discovery of tanzanite, is still yielding its secrets. Doubtless, other rich sources of old and new gems will be discovered.

The collector with a good variety should rest content if he adds a new gem every now and again. He will never get them all, but he can come fairly close.

THE TREASURE OF THE MOGHUL EMPERORS OF INDIA

By N. VISWANATH

DURING the 16th and 17th centuries, India was ruled by the Emperors of the Moghul Dynasty. Of them, six were the most powerful and notable. They were: Babar, Humayun, Akbar, Jehangir, Shahjahan and Aurangzeb. With the death of the last Emperor, the dynasty began disintegrating.

It was during the reign of the last three Emperors that the wealth of the Moghuls was at its peak. Historians have been unable as yet to determine exactly how much the Moghul treasure was worth as some of it was looted by subsequent rulers of India.

Fortunately, Emperor Jehangir has left an authoritative account of his treasure and the list still exists. There was bullion in his treasury amounting to seven tons of gold, and 1,116 tons of silver. Among precious stones, there were 80 pounds (more than 5,000,000 carats) of uncut diamonds, 100 pounds each of rubies and emeralds, and 600 pounds of pearls. "Of the other less important varieties of precious stones, the quantity is infinite," says the document.

The royal armoury included 2,000 swords studded with diamond-encrusted handles, and the court furniture included 103 chairs of solid silver and five of solid gold. For high dignitaries and visiting monarchs, there were better seating arrangements. Five gorgeous thrones, two of gold and three of silver, were set apart for such persons. Emperor Jehangir himself had seven diamond studded thrones besides the famous Peacock Throne.

Jehangir's bathtub today, would be worth the ransom of a billionnaire. It was seven feet by five feet in dimensions and was decorated with diamonds "to relieve the drabness of gold".

His son Shahjehan, the fifth Moghul Emperor who built the world famous Taj Mahal at Agra was a great connoisseur himself. It was said of him that there was no jeweller in the East who could value precious stones better than he could and the emperor had all luck in pursuing his hobby. He had the first choice of the world's richest diamond mines, the famous Golconda fields, and only his rejections were allowed to circulate in the market.

Incidentally, until 1726 AD, the major source of diamonds in the world were the Golconda mines in India. The Pitt, the

Regent, and the Kohinoor are a few of the historic diamonds that owe their origin to Golconda.

Sir Thomas Roe, the British Ambassador to Emperor Shahjehan's Court, knew to his cost that there could be no trifling with the Emperor. Sir Thomas had something like the mythical Unicorn's horn to palm off. Knowing Shahjehan's weakness for rare treasure, Sir Thomas tried some sales talk with the Emperor saying that he was offering the horn to him only because the Emperor was the person to appreciate its value.

The horn was supposed to have the rare property of neutralizing any poisonous liquid and as such was considered to be a very welcome gift to sovereigns like Shahjehan, whose life was always in constant danger from enemies. He had hoped this would induce the Emperor to pass it at a high price.

But the shrewd Emperor knew that the horn was not worth the price quoted. He merely thanked the Ambassador and dropped the subject with a courteous expression. The diplomat had to find some other gullible purchaser, and finally, it was disposed of at a cheap price to a Dutch captain.

Shahjehan was no hoarder and often gave away fabulous gems as outright gifts. One day, a diamond "brighter than the Pole Star" came to his hands from the Golconda mines and the "bulwork of Islam" as Shahjehan liked to call himself, decided that this would be a worthy gift to the Prophet's Mosque at Mecca. He immediately ordered that a gold candelabra weighing 14 pounds be selected, embellished it with the "brighter than the Pole Star" diamond, and had it sent post-haste to Mecca. Today, a conservative value of the gift would be about ten million rupees.

Imperial wars also brought treasures to the royal jewel box. When the Moghul forces invaded his domain during the early part of Shahjehan's reign, the King of Golconda found it advisable to make a "peace offering". He sent 200 caskets of jewels to placate the Emperor. But the unfortunate King did not escape his fate. With averice kindled at the gift, Shahjehan ordered his troops to advance, and they returned with booty exceeding 300 million rupees in value.

No historian could make a correct estimate of Shahjehan's wealth of which it was said that it was greater than that of his nearest rivals, the Emperors of France and Persia, put together.

But then, there had to be a place to keep all this booty. One fine morning, the Emperor was told by the Master of the Treasury

that it was choking with jewels, and that something had to be done to the strong room to relieve the congestion. The Emperor mused for a while. The problem was finally solved by the creation of the famous Peacock Throne. In the late 17th century when it was made, the Throne was valued at an amount equivalent to 530 million rupees. The Throne was completed after seven years of unceasing labour by the Emperor's best craftsmen.

The plate and cutlery of Shahjehan's palace weighed 25 tons of gold and 50 tons of silver, respectively. The mere gold content of the plate would today be worth more than 15 million rupees.

In one of his tributes to Shahjehan, Sir Thomas Roe has remarked that the King of Bijapur sent to the Emperor 36 elephants, two of which were adorned with gold chains weighing 400 pounds. There were 50 horses in the gift with trappings worth five million rupees. All possible care was taken that the precious stones were properly graded according to the exacting imperial specifications. For example, the diamonds were divided into 12 categories while the pearls were of 16 varying grades.

The draperies of the palace were valued at ten million rupees, and the furnishings included chinaware to the value of 2,500,000 rupees. All the procelain was imported from China under a special order from the Emperor and was among the best in the era.

The Moghul Emperors were so particular about chinaware that once when a high-ranking officer of the imperial household broke a matching piece of porcelain dish, Emperor Aurangzeb behaved as roughly as an ordinary housewife. He was on a tour of his domains in South India when the hapless official dropped the fruit dish in the capital, Delhi, about 1,000 and odd miles away from the Emperor. The culprit knew full well that his carelessness would bring a halter round his neck and at once despatched a messenger to China to bring back a similar dish to complete the set. He had hoped that the dish would reach Delhi before the Emperor returned from his tour. Unfortunately for him, the Emperor returned far ahead of the schedule, and in course of time, wanted his favourite fruit dish. The trembling official related the accident, and in view of the fact that arrangements had already been made to get a replacement, the official was temporarily excused and suspended pending arrival of the caravan from China.

But the notorious Central Asian robbers made short work of the messengers and the money they carried for purchase of the

chinaware. When the period of grace elapsed and there was no news from China, the irate Emperor gave the official the choice between immediate execution and that of going to China to get the porcelain dish.

The official chose the latter course and began the hazardous journey to Cathay (China). As his whole family was held as hostages by the Emperor, he had to be particularly careful about his life and chose the safe route through the Pamir mountains, the so-called backbone of the world. The ranges of the Pamirs tower to a height of about 23,000 feet and one can very well imagine the plight of the official. Fortunately, Heaven took pity on him and the story of this official reached the court of the then Persian Emperor. This monarch ordered his Grand Wazier to look in the royal Persian cupboards to find whether there was any porcelain dish to match the one for which the official was searching. Happily, such a piece was found, and the Persian Emperor ordered that a gift of this porcelain dish be made to the official. But the poor man was so much broken down in health from the rigours of the journey that he died *en route* by the time deliverance came.

Emperor Shahjehan did not keep all his treasures in one place. They were divided in varying proportions and were kept in fortresses in different parts of the empire. There were seven of these treasure forts, besides the capital of Delhi. They were: Gwalior, Marwar, Lahore, Rantambher, Asirgarh, Rohstsagar, and of course, Agra. The Lahore fort contained the maximum quantity of bullion, while Agra, as the Emperor's favourite citadel, held most of the jewels.

A comparison with monarchs of the present century puts Shahjehan in a very favourable light. The wealth of the British Sovereign is estimated at about 170 million dollars. But at a time when the money value was at least six times greater than that of the present era, Shahjehan's treasury must have held billions of rupees worth of valuables.

The late Nizam of Hyderabad in India, who was a remote descendant of the Moghul dynasty, had treasure and jewellery which it was almost impossible to sell for want of buyers. What can one do with mats woven with priceless pearls and shirts studded with diamonds? He had a paperweight, the famous Jacob diamond, a treasure of 150 carats, the rock-bottom price of which was about Rs.150 lakhs.

Gemmological Abstracts

ANON. *Kashan flux-grown rubies.* Gems and Gemology, 1969, XIII, 2, 30-34, 12 illus.

These rubies are grown by a flux-fusion method by Ardon Associates. They are characterized by numerous dot-and-dash flux inclusions and veil-like feathers, the latter resembling those seen in synthetic emerald. Except for their inclusions and their transparency to ultra-violet light, their properties are almost identical with natural rubies.

R.W.

BANK (H.). *Zur Unterscheidung optisch einachsiger und zweiachsiger Minerale in der Gemmologie.* The differentiation between uniaxial and biaxial minerals in gemmology. Zeitschr. d. Deutsch. Gemmologischen Gesellschaft, 1969, 18, 3, pp. 108-112.

The author stresses the importance of using the refractometer for distinguishing between optically uniaxial and biaxial stones; in some cases this means distinguishing between the natural and synthetic gem. A short list of these stones is given.

E.S.

BANK (H.). *Farbe und Farbveränderungen bei Topaz.* Colour and colour change in topaz. Zeitschr. d. Deutsch. Gemmologischen Gesellschaft, 1969, 18, 4 pp. 171-175.

With the help of an extensive bibliography the author describes colour and colour changes in topaz brought about by heat-treatment and by irradiation with x-rays and radium. During the last few years irradiated brown topazes have been on the market, which can be differentiated from the natural brown stones by their different refractive indices. Certain yellow topazes from Siberia become paler by exposure to daylight, and some pale topazes become pale yellow in the same way.

E.S.

BANK (H.). *Spodumene seine Varietäten. Hiddenit und Kunzit.* Spodumene and its varieties hiddenite and kunzite. Zeitschr. d. Deutsch. Gemmologischen Gesellshaft, 1969, 18, 4, pp. 176-180. Extensive bibliography.

Colour changes in spodumene can be brought about by heating, violet kunzite becoming pink, and irradiation. Irradiated kunzite changed to a grass-green colour similar to hiddenite, but could still be differentiated from that stone by luminescence, which hiddenite does not show. When irradiated with x-rays kunzite does not seem to alter its colour, while hiddenite changes from yellowish to green. Various other examples are given and it is shown how difficult it is to distinguish between kunzite and hiddenite. Physical characteristics are given.

E.S.

BANK, (H.). *Synthetisches Strontiumtitanat.* Synthetic strontium titanate. Zeitschr. d. Deutsch. Gemmologischen Gesellschaft, 1969, 18, 4, pp. 181-183.

Synthetic strontium titanate is easily distinguishable from diamonds by appearance and high specific gravity. A synthetic strontium titanate-topaz doublet has been on the market for some time.

E.S.

BOLTON (H. C.). *Hexagonal diamond—a new crystal form.* Australian Gemmologist, 1969, X, 6, 18-20, 2 illus.

Discusses the synthesis of diamond with hexagonal symmetry. An explanation is given of the atomic arrangement, and there are some observations on the possibility of natural hexagonal diamonds being found.

R.W.

CHALMERS (R. O.). *A new occurrence of precious opal of volcanic origin near Mullumbimby, New South Wales.* Australian Gemmologist, 1969, X, 6, 10-13.

An account of the new find of opal in New South Wales. The geology, occurrence and mineralogy of this new opal are discussed.

R.W.

CLAYTON (N.). *The first discovery of Australian opal.* Australian Gemmologist, 1969, X, 6, 13-14.

A research in the archives at the City of Adelaide have brought to light papers on Johann Menge (often given in literature as Mingaye) and these papers fairly well establish the right of this person to have been the first to discover opal in Australia.

R.W.

COCKS (F. B.). *Photography as an aid to recovery.* Australian Gemmologist, 1968, X, 2, 11-14, 3 illus.

This is the first part of a series and this instalment deals with the suggested use of photography of gemstones and their inclusions as a means for the production of identity certificates which would have a value in assisting the recovery of lost or stolen jewellery. This aspect is understandable when it is realized that the author is not only a qualified gemmologist but also a Police Officer.

R.W.

COCKS (F. B.). *Photography of inclusions in gemstones.* Australian Gemmologist, 1968, X, 3 and 4, 9-12, 12-18, 11 illus.

The second and third instalments of this series deals with the equipment needed and the setting up for taking photographs of the inclusions in gemstones. The article is clearly written and the explanations are in simple terms. Only normal instruments are discussed, the writer refraining from any discussion on high-priced specialist apparatus. The types of lighting needed, the films best to use and the exposure times are gone into, and the use of a copying stand is mentioned. A single-lens reflex camera is the camera advocated.

R.W.

COTTON (W. L.). *A trip to the Carnaiba emerald mines of Brazil.* Lapidary Journ., XXIII, 10, 1360-1363, 12 coloured plates.

A first-hand account of a visit to the emerald mines at Carnaiba. The mines are open-cut workings and the stones are found in a grey-green clay which is an altered pegmatite. The mining is an altered pegmatite. The mining is communal or run by families of miners who own small plots. There is no organized mining by large concerns.

R.W.

CROWNINGSHIELD (R.). *Diamonair—a new diamond substitute.* Jewellers Circular-Keystone, 1969 (December), 50, 6 illus.

A general and factual article on the colourless yttrium aluminium garnet, to which the name "diamonair" has been given.

R.W.

CROWNINGSHIELD (R.). *Developments and highlights at the Gem Trade laboratory in New York.* Gems and Gemology, 1968/9, XII, 12, 372-378, 14 illus.

Reference is made to a type of imitation turquoise which has a refractive index variation of 1·57 to 1·60 and a density of 2·49 to 2·59. A hot needle brought up to the specimen will cause it to "fluff-up" and turn white but give off no smell. Hydrochloric acid when applied to the surface will turn yellow. The article describes the absorption spectra of various types of synthetic scheelites, greenockite and europium and yttrium garnets. These spectra are illustrated by line drawings. A transparent grossular garnet showed a red-orange fluorescence under long-wave ultraviolet light and a yellow-orange under the short-wave lamp. The hazards of steam-cleaning of gemstones is commented upon. Some special features of diamond are mentioned and an unusual fluorescence shown by a synthetic emerald—which showed a stronger crimson glow when under the short-wave lamp than when under the long-wave lamp—is commented upon.

R.W.

CROWNINGSHIELD (R.). *Developments and highlights at G.I.A's laboratory in New York.* Gems and Gemology, 1969, XIII, 3, 89-96, 20 illus.

Items noted were a transparent actinolite, orange-brown and yellow-brown treated diamonds, a smoke-treated opal, tissue-graft pearls and a chrome-green grossularite. Flux-grown synthetic rubies are reported on, one of which exhibited triangular metallic inclusions. It is mentioned that these synthetic rubies glowed with a crimson glow which was stronger under the short-wave lamp. It is reported that Y.A.G. is now called "diamonair". Some stones of this type when cut for maximum yield may show "naturals" on the girdle from the crystal growth marks on the side of the "pulled" crystal.

R.W.

CROWNINGSHIELD (R.). *Developments and highlights in the Gem Trade laboratory in New York.* Gems and Gemology, 1969, XIII, 1, 15-21, 16 illus.

Reports a rock mixture, consisting mostly of opal and grunerite which gives a "tiger-eye" appearance. It has been marketed under the misnomer "Fire Jade". Examination has been made of Tanzanian garnets and other Tanzanian materials. Yttrium aluminium garnets and yttrium oxide are mentioned. A "poured marble" cameo consisting of a ground up and compressed marble was investigated. A zoisite, a "cherry-stone" clam pearl, and damage to a diamond are reported upon. Oddities seen as inclusions were platinum in a cut hydrothermal emerald and "needles" in a glass. An opal imitation consisting of a hollow-backed cabochon of rock crystal filled with opal chips which were bonded in a clear plastic is mentioned.

R.W.

CUTHBERT (D. L.). *Precious opal in Idaho.* Lapidary Journal, 1969, XXIII, 7, 928-930, 6 coloured illus.

Tells the story of the Spencer opal mine, its history and the occurrence and types of opal found in the mine. Some hints are given in the methods of cutting and polishing this opal.

R.W.

DURRAGH (P. J.). *Volcanic gem opals.* Australian Gemmologist, 1969, X, 8, 5-8, 8 illus.

Gives the results of the examination by electron microscopy of the new finds of opal at Mt. Bougrom in Queensland and New South Wales.

R.W.

FISCHER (B.). *The Cybernetic Diamond Polishing Automaton.* Diamant, 1970, 124, p. 5,.

In a Belgian laboratory a cybernetic automaton for the polishing of eight-cuts was developed, which has aroused keen interest in the governments of Belgium and Israel. Representatives of De Beers

and the Technion University at Haifa witnessed the machine at work.

Only cybernetics can bring about an adequate solution to the difficult problem of automatic polishing.

There is no question of automatic polishing if there is no continuous production. But continuous production is only possible if the scaife is kept impeccably.

Up to the present time all efforts at constructing an automatic polishing machine have been limited to making robots, which were capable only—just as pick-ups—of a few stereotyped operations.

Now it is not possible to keep the scaife intact with these small robots.

The slightest error in putting a stone on the scaife, in getting a facet that does not run true in relation to the axis of crystallization, in hitting a naat, causes the immediate and irreparable destruction of the microscopically thin layer—a few microns thick—of boart powder, composed of a infinite number of diamond particles, embedded in the scaife pores.

A cybernetic system had to be designed, which would be able to follow the same line of reasoning as a man, a computer who takes decisions second after second.

The electronic part is so sophisticated that it makes the same decisions as a man, only more precisely and more quickly, for a cybernetic machine does not grow tired and does not err.

The different cutting operations must be followed from second to second by the computer which must be able to make the decisions imposed on it by the information received from the electronic control systems concerning the axis of crystallization, naat if any, or any other element that interferes with normal cutting operations.

The cybernetic automaton is capable of recognising the direction in which to cut and also of finding it.

Moreover, if during polishing a naat appears when three-quarters of a facet is shaped, polishing stops. And the electronic brain will take a decision, which will be either to look for another polishing direction or to stop polishing altogether.

This sophisticated system permits the tackling of whole stones and the solving, owing to as yet not publicly known techniques, of the problems posed by flat naats: whereas skilled workers have many difficulties with these stones the cybernetic automaton easily conquers them.

It is this complicated achievement which constitutes a research instrument that will lead to other still more decisive achievements.

The finished stone is beautifully made, with each facet being perfectly smooth.

The machine accepts all sizes of stones.

A defect, such as an imperfect girdle, due to the cutter, is no obstacle.

Upper and lower parts of the stone are polished equally easily as there is no problem in fixing the size of the facets, which are put on with great precision thanks to extremely accurate systems.

The cybernetical part is such, that it allows the machine to direct itself, which means that it may change its judgement. This is repeated at each new facet, as the constitution of the stone varies—with regard to polishing—according to the parameters, which are the axis of crystallization, naat, etc.

S.P.

GLOVER (J. E.). *Western Australian emeralds.* Australian Gemmologist, 1968, X, 2, 15-17.

A survey of the properties of emeralds found at Poona in Western Australia. Analyses are given, and the exact location of the mine is given by map references. The value of the density of these emeralds is reported to be 2·69 and the refractive indices as 1·578-1·573. It is interesting that no vanadium is shown by the analysis. There is a list of references and one table.

R.W.

GRUBB (P. L. C.), DONNELLY (T. H.). *Colour changes in elbaite tourmaline from Ravensthorpe, Western Australia.* Australian Gemmologist, 1969, X, 8, 15-18, 1 illus., 4 tables.

A record of experiments carried out on tourmalines from the Ravensthorpe area. The tourmalines examined had zonal colouration in red and green. Chemical analyses, optical properties and heating experiments are recorded. It is concluded from the experiments that colour variants in elbaite crystals are determined primilarly by differences in Mn^{2+}/Mn^{3+} and Fe^{2+}/Fe^{3+} ratios.

R.W.

HOLLAND (S.). *Nephrite jade in British Columbia.* Lapidary Journ. 1969, XXIII, 9, 1244-1248, 2 Maps.

Reprinted from the annual report of the British Columbia Department of Mines and Petroleum Resources this article gives an authentic coverage of the subject. Types of jade (nephrite), the range of density, and the structure both in hand-specimens and by thin-section examination are discussed. The nephrite was first found in the Frazer River area during 1938, but the material was not generally known until 1949. An important article completed with a list of references.

R.W.

LEADBEATER (P. W.). *Cameos and intaglios.* Australian Gemmologist, 1969, X, 6, 15-17.

A general article on carved gems giving much of the history of the art and the materials used for these carved gems.

R.W.

LEIPER (H.). *Orienting blue topaz with ultra-violet light.* Lapidary Journ., 1969, XXIII, 9, 1250-1255, 1 illus.

A revision of an article published in 1955 (Journ. Gemmology, V, 3, 135-140). The original work was mainly on topaz from American sources. Now further work has been carried out on blue topaz from other localities.

R.W.

LIDDICOAT (R. T.). *Developments and highlights in the Gem Trade laboratory in Los Angeles.* Gems and Gemology, 1968/9, XII, 12, 379-383, 9 illus.

Linobate (lithium niobate or lithium metatitanate) is discussed. Some mention is made of odd inclusions seen in diamond, opal and in peridot. An unusual star-doublet, which consisted of a corundum cap to a star-sapphire base, and a cat's-eye zoisite are reported.

R.W.

LIDDICOAT (R. T.). *Developments and highlights in the Gem Trade laboratory in Los Angeles.* Gems and Gemology, 1969, XIII, 1, 22-29, 21 illus.

More information is given on the yttrium aluminium garnets,

synthetic greenockite, periclase and chrysoberyl. Changes in the characteristics of synthetic emerald are noted. True doublets consisting of two parts of Montana sapphire have been encountered, and a report is made on some unusual Mexican opals. A bead necklet made of vegetable ivory is mentioned.

R.W.

LIDDICOAT (R. T.). *Developments and highlights at G.I.A's laboratory in Los Angeles.* Gems and Gemology, 1969, XIII, 3, 97-102, 10 illus.

Refers to some unusual opals which had low refractive index, near 1·38, and low density, near 1·42. These opals are probably of Mexican origin. Hornbill "ivory" is another material discussed. Other items referred to are dodecahedral inclusion lines in a diamond, curved fluorescence in a synthetic sapphire, crystallites in glass and inclusions in synthetic and natural emeralds.

R.W.

LÖNS (H. H.). *Die Beschreibung von Ebenen und Richtungen in Kristallen mit Hilfe von Ziffernkombinationen (Millersche Indizes).* Description of faces and directions in crystals with the help of Miller indices. Zeitschr. d. Deutsch. Gemmologischen Gesellschaft, 1969, 18, 4, pp. 164-170.

Well illustrated article. In crystallography it is not essential for the axes to be at right angles and symmetrical. However, in the case of diamond the axes are usually symmetrical and equal; one usually finds cubic, rhombic dodecahedral and octahedral faces.

E.S.

MALES (P. A.). *Opal in volcanic rock.* Australian Gemmologist, 1968, X, 4, 9-11.

The article discusses the sources of opal in Australia which is found in volcanic rocks.

R.W.

MAGILL (S.). *White gold of the Odenwald.* Lapidary Journal, 1969, XXIII, 8, 1097-1102, 12 illus.

An historical account of the ivory carvers of Erbach in Western Germany. The ivory is imported as whole tusks from Antwerp and

Rotterdam. Various types of ivory are discussed. It is a popularly written article and refers to a little known industry.

R.W.

MEEN (V. B.), TUSHINGHAM (A. D.), WAITE (C. G.). *The Darya-i-nur and the Tavrnier Great Table.* Australian Gemmologist, 1968, X, 3, 16-24, 6 illus.

The authors, who formed a group to go out to Iran to examine officially the Crown Jewels of that country, pen this article on the historical aspects of some of the famous Indian diamonds. It is the authors' opinion that the Darya-i-nur is actually the major portion of the Great Table diamond. An informative and entertaining article.

R.W.

MEEN (V. B.). *The largest gems of the Crown Jewels of Iran.* Gems and Gemology, 1969, XIII, 1, 2-13, 13 illus.

Dr. Meen, with others, made a scientific study of the Crown Jewels of Iran (Persia) and in this article details in full the more important gems in this State collection. A remarkable and authentic work.

R.W.

MERTENS (R.). *Die Vielfalt der Granate.* Varieties of garnets. Zeitschr. d. Deutsch. Gemmologischen Gesellschaft, 1969, 18, 3 pp., 113-118.

The author reviews the various types of garnets and includes a useful table, listing hardness, S.G., R.I. dispersion and colour for almandine, rhodolite, pyrope, grossular, andradite, melanite, spessartite and uvarovite.

E.S.

OLDENDORFF, (P.). *Ein Beitrag zur Lösung des Brillianzproblems.* A contribution to the solution of the problems connected with brilliance. Zeitschr. d. Deutsch. Gemmologischen Gesellschaft, 1969, 18, 3, pp. 99-107.

The path of the light rays in differently brilliant-cut stones (Tolkowsky, Eppler) and the importance of the total height of the stone and the radius of the table are discussed.

E.S.

OUGHTON (J. H.). *The direct-vision spectroscope.* Australian Gemmologist, 1968, X, 4, 21-27, 7 illus.

An excellent article surveying the construction and use of the hand-spectroscope. It is clearly and simply written and conveys all the salient points. A perfect resumé for student training.

R.W.

PENZE (J.). *Einschlusse in Edelsteinen und ihre Bezeichnung.* Inclusions in gem stones and their nomenclature. Zeitschr. d. Deutsch. Gemmologischen, Gesellschaft, 1969, 18, 4, pp. 157-163.

There seems to be no difficulty in naming simple inclusions, such as rutile needles or tourmaline crystals, or even gas bubbles. There seems to be some confusion in dealing with two-phase and three-phase inclusions and this the author talks about at some length. Willard Gibbs first described "phases" in 1880. Physical characteristics are described, especially how these phase-inclusions are influenced by temperature, pressure and the quantity of soluble material. There are 2 illustrations of two-phase and three-phase inclusions in Brazilian and Colombian emeralds.

E.S.

PRIDER (R. T.). *Metamorphism and gemstone formation.* Australian Gemmologist, 1969, X, 6, 7-9.

Based on the Presidential address to the Australian Gemmological Association, the article discusses fully the various types of metamorphism and the effect of change in rocks due to them. The gem minerals which form during these changes are mentioned.

R.W.

ROLFF (A.). *A trip to the famous citrine areas of Brazil.* Lapidary Journ., 1969, XXIII, 8, 1152-1161, 11 illus.

Describes a visit the author paid to the mines around the town of Cristalina in the State of Goias. The quartz crystals occur in tectonic cavities and are rock-crystal, morion, smoky quartz and citrine. An interesting and informative article.

R.W.

ROLFF (A.). *The geological environment for emerald in Brazil.* Lapidary Journ., 1970, XXIII, 11, 1488-1501, 16 illus., 4 coloured plates.

A concise survey of the emerald deposits of Brazil. The history, the geology, methods of mining and the actual locations of the various mines in Brazil are discussed. Much information in a short article.

R.W.

RONZIO (A. R.), SALMON (M.). *Trace elements in jade.* Gems and Minerals, 1970, 389, 24.

Results of trace elements in nephrite and jadeite. All samples, 30 nephrite and 4 jadeite, contained iron and nickel, and the majority also contained manganese, chromium, zinc and copper. It is not certain which element is responsible for the colour in pink jade.

S.P.

SANDERS (E. A.). *Modern reefs.* Australian Gemmologist, 1969, X, 5, 21-25, 2 illus.

Although the article is mainly concerned with the coral reefs of Australia and the Pacific Ocean, the article concludes with a short but singularly good resumé of gem corals.

R.W.

SNOW (J. J.). *Combined light and spectroscope.* Australian Gemmologist, 1968, X, 4, 28-29, 2 illus.

Describes a spectroscope and light source constructed as one unit. Full details are given.

R.W.

SNOW (J. J.). *Infra-red photography.* Australian Gemmologist, 1969, X, 5, 26-27, 5 illus.

Details an experimental work which breaks new ground. The photography of the inclusions in gemstones using infra-red light and infra-red film and by dark ground illumination using infra-red light source. Full details are given.

R.W.

SOKLICH (P.). *Recent discovery of dravite in Western Australia.* Lapidary Journ., 1970, XXIII, 10, 1354-1359, 2 illus., one page of colour plates.

A popular article on the mining for dravite (tourmaline) crystals at Yinnietharra, Western Australia. Black tourmaline is also found at this place. The mining is carried out by open-cut methods after blasting the rock.

R.W.

SWITZER (G.). *Russia No. 2 in diamonds.* Lapidary Journal, 1970, XXIII, 11, 1516-1519, 2 illus.

Tells of the present position of the Russian diamond production and discusses its relation to other producers. The article is completed with an up-to-date table of the world production of diamonds.

R.W.

THURM (R.). *A new polariscope and conoscope.* Australian Gemmologist, 1969, X, 6, 22-24, 4 illus.

Details the construction and use of a new polariscope which is so arranged as to incorporate lenses for the production of conoscopic figures.

R.W.

TROUP (G. J.). *The alexandrite effect.* Australian Gemmologist, 1969, X, 5, 9-12, 5 illus.

Mainly a scientific discussion giving explanations for the reason of the colour change in alexandrite and "synthetic alexandrite" (corundum).

R.W.

TROUP (G. J.). *The radiofrequency spectra of gemstones.* Australian Gemmologist, 1969, X, 7, 19-22, 4 illus.

An elegant article on the subject of magnetic resonance spectroscopy using radiofrequencies. The basic principles are given and some of the results obtained. The article concludes with some notes on the use of gemstones as Masers.

R.W.

BOOK REVIEWS

MURRAY, S. J. *Shell Life and Shell Collecting.* The Oak Tree Press, London, 1970, 96 pp., 12 pages colour photographs, many other photographs and drawings. Price £1 15s. 0d. (£1.75).

Shell collecting is an absorbing hobby, leading to an appreciation of art and the sea. The illustrations show how the animals and shells are constructed, and their distinguishing characteristics. The reader is told where to look for perfect specimens, how to clean shells, identify them and how to keep a neat collection. Sonia Murray's book will interest both children and adults.

S.P.

LENZEN, G. *The history of diamond production and the diamond trade.* Tr. from German by Bradley, F. Barrie & Jenkins (1970), 230 pages, 38 illus. 80s.

This volume is the end product of a thesis written by the author for academic purposes and is in general a compilation of data abstracted from ancient, medieval and modern literature. These are correlated and thoroughly discussed. The book begins with a survey of the earliest history of diamond in which some criticism is made of the summing-up given by other authors. The diamond as a mineral, as a gem and as a tool is reviewed and some assessment of the reasons for the prestige of diamond throughout the ages are given. There are two chapters devoted to the Indian deposits. In these chapters there is given a full record of the various geographical areas of India where diamonds were found, and an assessment is made of the trading routes through which diamonds passed out of India in olden days. There is a discussion on ancient gemstone weights, and on the origin of the fashioning of diamond. Much information is given on the price calculation of value of diamonds at various periods of history. There is a chapter in similar vein on the Brazilian deposits. The history of the diamond deposits of Southern Africa is extremely well considered, the author having amassed a wealth of information on the mines and mining companies and how they began and developed. There

is much information given on the production figures and on price control. Little is mentioned concerning the diamond localities of Central Africa and, except for a short note in the postscript, there is but a brief note of the Russian deposits, but there is a short but adequate mention of the synthetic diamond production. At the end of each chapter there is appended an extensive list of notes and references, and there is an extremely full bibliography at the end of the book. There is an index of names and a geographical index, but no subject index. Very few typographical errors were noticed, but the misspelling of Grodzinski as Grodzinsky throughout the text (though correctly put in the bibliography) tends to stand out. The volume is an excellent compilation and as a reference book should be in every gemmological library.

R.W.

GÜBELIN, E. *Pierres Précieuses.* Editions Silva, Zurich, 1969, (In French, German and Italian).

This is not a text-book on gemmology, but intended to be a treasure trove for lovers of beauty. It is an attempt to combine enthusiasm for the fascination and glamour of gems with worthwhile gemmological knowledge. An English version of the book is intended, and a detailed review will be given when this edition is available.

S.P.

BAUER, M. *Precious Stones.* Griffin, London, 1968, 95 drawings and 20 plates. Hard bound (single volume) £8 10s. 0d., paperback (two volumes) £2 10s. 0d.

A reprint of the English translation by L. J. Spencer of the German book originally published in 1904. A new Foreword and Addenda have been prepared by Dr. Edward Olsen, Curator of Mineralogy at the Field Museum of Natural History in Chicago.

This classic work in precious stones has long served as the standard work in its field and has been called "the most detailed work on gems" by the *Encyclopaedia Britannica.* Amateur mineral hobbyists as well as professional gem and jewelry dealers will find here a wealth of information on all aspects of gemmology, from assembling collections to cutting and polishing stones.

The book begins with a discussion of the general characteristics and applications of gem minerals, how they are cut, how faults and counterfeits are detected, how the value of a gem is determined, etc. Then, each type of precious stone is discussed thoroughly, beginning with nearly 150 pages on the diamond. 53 additional gem minerals are covered and dozens of varieties, including corundum, spinel, chrysoberyl, beryl, topaz, garnet, opal, turquoise, feldspar, and quartz. Professor Bauer provides detailed information on the chemical composition of each stone, its hardness, colour variations and lustre, distribution and occurrence, types of rock in which the gem is found, how it is mined, and much more. He also relates many of the stories and legends connected with individual stones which are famous for their size or historical associations. Of special interest is a 20-page section giving precise instructions for distinguishing between precious stones with similar appearances and for detecting imitations. An extensive appendix covers coral and pearls.

S.P.

WEBSTER, R. *Gems—their sources, descriptions and identification.* Butterworths, London, second edition, 1970. Price £12 (U.K. only).

The second edition of this comprehensive work has been brought up-to-date by the addition of various chapters, including new information on synthetic stones. New tables on plastics and their identification have also been added. The colour plates of the early addition have been replaced, and those provided by the Geological Survey are particularly well reproduced.

The first edition of Webster's monumental work was in two volumes. The single volume of the second edition is a considerable improvement. The index is extremely detailed and the author, a professional gemmologist, has been painstaking in incorporating as much up-to-date information as possible.

It is the most comprehensive, accurate and readable account of gemstones at present available in the English language.

M.S.

ASSOCIATION NOTICES

GIFTS TO THE ASSOCIATION

The Council of the Association is grateful to Mr. D. Mountfort, F.G.A.A., of Kingsford, New South Wales, Australia, for an opal doublet.

OBITUARY

Nigel W. Kennedy, 2nd April, 1970 (D. 1948). Lecturer in gemmology at the Liverpool College of Art for many years.

ANNUAL GENERAL MEETING

The 40th General Meeting of the Gemmological Association of Great Britain was held on Thursday, 23rd April, 1970, at the North British Hotel, Glasgow. Mr. Norman Harper, Chairman of the Association, presided and said that he was delighted that it had been possible to hold the Annual Meeting in Scotland for the first time. The Council was grateful for the work done by the Scottish Branch in encouraging and maintaining interest in gemmology. It is hoped that it will be possible for the Branch to arrange another Diamond Course in Scotland later this year.

In his report Mr. Harper said that the thing that stood out was the extraordinary enthusiasm for a fascinating subject. Almost every year at the Presentation of Awards a "highest record" examination entry can be reported. Last year 767 people were examined in gemmology and this throws an immense strain on the staff for whom sufficient appreciation cannot be shown. It is also significant that half the membership of the Association is overseas.

Mr. Harper commented that the office is kept busy with

gemmological enquiries from all over the world and two programmes about gemmology on the radio have produced a flood of enquiries from persons in the U.K. In order to cope with the extra work it will be necessary to make a substantial and more realistic contribution to administration costs involved on our behalf by the National Association of Goldsmiths. The council have agreed that from the 1st January next year the annual subscription must be increased from £2 2s. 0d. to £3 0s. 0d., but even at £3 0s. 0d. the subscription, which includes *The Journal of Gemmology*, is very good value. It is 13 years since the subscription was altered and when one considers how costs have risen the Association cannot do otherwise than express gratitude to the National Association of Goldsmiths for enabling the subscription to be kept at such a low rate for so long.

Referring to *The Journal of Gemmology*, Mr. Harper mentioned that articles are always required. They need not be of high scientific standing—a little more light relief such as has crept into some of the recent issues is always welcome. It is hoped that as many members as possible will endeavour to provide worthy contributions.

Mr. Dennis Hill, Chairman of the Scottish Branch, seconded the motion adopting the Annual Report and Accounts.

The following Officers were elected: Sir Lawrence Bragg, President; Mr. Norman Harper, Chairman; Mr. Philip Riley, Deputy Chairman; Mr. Douglas King, Vice-Chairman and Mr. F. E. Lawson Clarke, Treasurer.

Mr. Harper expressed appreciation on behalf of the Council that Sir Lawrence Bragg continued as President. Dr. G. F. Claringbull, who has served as an Examiner since 1938, was elected as a Vice-President. Miss Iris Hopkins was re-elected to serve on the Council.

It was announced that Messrs. Watson Collin & Co., chartered accountants, had signified their willingness to continue as auditors.

BRANCH MEETINGS

The Annual General Meeting of the Scottish Branch was held on the 23rd April, 1970, at the North British Hotel, Glasgow.

This followed the Annual Meeting of the Gemmological Association.

Mr. Dennis Hill, Chairman of the Branch, reported on the work of the year, especially the enthusiasm shown for the Gemstone Quiz. He mentioned, however, that it had not been possible to arrange an Advanced Diamond Course, due to insufficient enrolments, which was most disappointing after the success of the previous year. Mr. Hill went on to report a proposed gemstone exhibition to be held in Glasgow in the autumn of 1971. Concluding, the Chairman thanked the Committee and Branch members for their work during the year. The election of Officers followed and all were re-elected.

The summer outing of the Scottish Branch this year will be to see the Royal Scottish Regalia at Edinburgh Castle and the mineral collection at the Royal Scottish Museum.

COUNCIL MEETING

At a meeting of the Council of the Association held on Tuesday, 14th April, 1970, the following elections took place:—

Fellowship

Almenar Ibanez, Vincente,
Valencia, Spain. D. 1969

Davidson, Terence Malcolm John,
High Wycombe, Bucks. D. 1962

Fernandez Gil, Enrique,
Valencia, Spain. D. 1969

Navarro Bort, Rodolfo,
Valencia, Spain. D. 1969

Peris Bataller, Francisco,
Valencia, Spain. D. 1969

Ripolles Ferrara, Jose,
Valencia, Spain. D. 1969

Rosich Chova, Francisco,
Valencia, Spain. D. 1969

Sanchis Estrems, Jose,
Valencia, Spain. D. 1969

Sanchis Estrems, Salvador,
Valencia, Spain. D. 1969

Torres De Goytia, Rafael,
Valencia, Spain. D. 1969

Ordinary Membership

Bowman, David, Loughton, Essex

Cavouras, Evangelos,
Rio de Janeiro, Brazil

Coxon, Andrew Michael,
Totteridge, London

Daftery, Baboobhai Laxmidas,
Bombay, India

Dikhoff, Gerrit Theodorus
Herminecus, Sneek, Netherlands

Drake, John William,
Coggeshall, Essex

Dusan, Vadnal
Ljubljana, Yugoslavia

Franco, Ricardo,
Winter Park, Florida, U.S.A.

Fujimoto, Seishichiro,
Nagasaki-Ken., Japan

Gardiner, Anthony C., Abadan, Iran

Gopalji, Kantilal P.,
Palmers Green, London
Haag, Susanne Renete,
Kirschweiler, West Germany
Haug, Jan Steiner, Vilberg, Norway
Hawes, John, Wakefield, Yorkshire
Heyes, Alan John, Lancing, Sussex
Ishizuka, Makoto, Yokohama, Japan
Karunaratna, Avanti Yasmin,
Colombo, Ceylon
Kashima, Shigehiro, Tokyo, Japan
Kawahara, Nobuyuki, Tokyo, Japan
Kobayishi, Kichichiro, Tokyo, Japan
Kontani, Fusajiro, Tokyo, Japan
Krishnachari, Dharwar, India
Kubo, Yoshihiro, Tokyo, Japan
Kunitake, Hiroko
Fukuoka-Ken, Japan
Le-Bon, Leo Humphrey,
Surbiton, Surrey
Lumley-Holmes, Barry,
Haxby, Yorks.
Martin, Colin Riley,
Kilmarnock, Scotland
McCormack-Smith, Berry,
Leawood, Kansas, U.S.A.
Morita, Kimiko, Tokyo, Japan
Nakagawa, Hideo,
Takaoka-Shi, Japan
Nakajima, Yukio, Kiriu-City, Japan
Nicolau Marti, Margarita,
Barcelona, Spain
Nishibe, Reiko, Tokyo, Japan
Ohguchi, Hideki, Yokohama, Japan
Okubo, Ryoichi, Tokyo, Japan
Otani, Hiroshi,
Kita-Ku Kyoto, Japan
Phillips, Diana Janet,
Hailsham, Sussex
Saito, Noboro, Kyoto, Japan
Schullin, Hans, Graz, Austria
Shrubsall, Graham Keith,
Comberton, Cambridge
Silva, Andra Baduge Kularatna de,
Singapore
Silver, William Willard,
Mainz, Germany
Snipper, Alison Bernice,
Maida Vale, London
Sool Shick, Kim, Seoul, Korea
Suzuki, Kazuo, Tokyo, Japan
Tabei, Hideo, Gumma-Ken, Japan
Thompson, Harry, Walton, Liverpool
Thomson, Peter, London
Toothill, Jack Edward,
Toronto, Canada
Tsuda, Yo, Okayama, Japan
Uchiyama, Koichi, Iwaki-shi, Japan
Van de Walle, Pierre,
Brugge, Belgium
Webb, Ernest,
Bury St. Edmunds, Suffolk
Welander, Oscar A.,
Feagus Falls, Minnesota, U.S.A.
Williams, Mary Helen,
Bad Godesberg, Germany
Yamamoto, Kenzo, Tokyo, Japan
Yamamoto, Takashi,
Yamanashi-Ken, Japan
Yanagisawa, Akira, Tokyo, Japan
Zarook, Mohamed Hazim, Ceylon
Zook, Theresa F.,
Alexandria, Virginia, U.S.A.

MEMBERS' MEETING

A meeting of members of the Association was held at Goldsmiths' Hall on the 14th April, 1970. Mr. G. F. Andrews presided and introduced Mr. B. W. Anderson, Director of the Diamond, Pearl and Precious Stone Trade Section of the London Chamber of Commerce, and Mr. R. Webster and Mr. A. E. Farn, also of the

Laboratory. The subject of their symposium was "Gemmological Points of View". Mr. Anderson said that it was almost 45 years ago that the laboratory started, the first of its kind in the world, with himself and a commissionaire as the total staff. The first work undertaken was the checking of pearls, and after a shaky first year it was not long before more than a thousand pearls a week were passing through the lab. It was not until a few years later, when Basil Anderson had been joined by C. J. Payne, that a start was made on testing gemstones.

Basil Anderson went on to say that the work undertaken at the laboratory was very different to that undertaken by a gemmological student in the classroom. However skilled a student was, he said, he was unlikely to conceive the type of problems tackled by the laboratory or how they were resolved. Long experience coupled with skill and modern instruments had to keep pace with the increasing complexity of the subject. In the laboratory one had to be sure that the stone was of a particular type and origin—one just could not make mistakes. Mistakes had been made, but he put these no higher than one in 10,000 reports and as something like 70,000 had been completed over the years he thought that was quite a good record of accuracy.

In addition to being accurate the work had to be completed rapidly if the laboratory was to give a satisfactory service to the trade, continued Mr. Anderson. A third way in which the work undertaken by the student and the scientist in the laboratory differed was in the way a stone was presented. Whereas the student received his stone in an unmounted state the laboratory was usually faced with the stone in a mount which was filthy dirty at the back.

Complexities apart, Mr. Anderson said that the apparatus used in the laboratory was very similar to that used by the student in the classroom. The use of binocular microscopes of the Greenough type which allowed the examiner to sit comfortably for long periods were an essential part of the equipment, he said. The main gemmological instruments, he said, the microscope, refractometer and spectroscope, were all in the laboratory as were the very essential accessories—ultra violet lamps, x-rays and a host of bits and pieces which were very valuable at times. He said that when they started gem testing in the early 1930's they tended to use the spectroscope a little shamefacedly but over the years the

laboratory staff had become more than convinced about its value as a gem testing instrument.

Mr. Anderson went on to say that a lot depended on first impressions, when a gemstone was first handed in at the laboratory. The first diagnosis by eye determined the line taken to "prove" the stone. Once the stone or pearl had been proved there was nothing more that could be done that would add to the knowledge alreadv gained and further time spent would only be wasted.

The second speaker was Alec Farn who used as his "text", The Laboratory; Precious Stone Trade, and Commerce, as extracted from the full title of the Laboratory. He said that of the three parts he considered commerce to be the most important. The Laboratory was a compact small team of five members and the work was constantly challenging and constantly changing and called for the co-operation of the talents of all five members to produce a result, which when published stood as a positive statement of fact. He said, putting one's signature to a certificate of a piece of jewellery which would probably be sold for thousands of pounds against the test certificate was a little different to the dealer or trader who just ventured an opinion about a piece.

The last speaker was Robert Webster who discussed giving evidence in courts of law as an expert and the pitfalls attached to doing this. He also referred to the Trade Descriptions Act and how it was being applied to the jewellery trade. Mr. Webster said he had given evidence in Court on many occasions. He pointed out that if one made up ones mind to assist in a matter there was always the possibility that ones presence would be required in Court as an expert witness. It was important to keep full records of all matters handled, as well as copies of reports issued. Often cases did not come to Court, but in many instances he had been consulted. In connection with the Trade Descriptions Act, Mr. Webster did not favour giving assistance to the Board of Trade because the Chamber's laboratory was a private one run for the jewellery trade and the Board had its own facilities for obtaining reports on identification.

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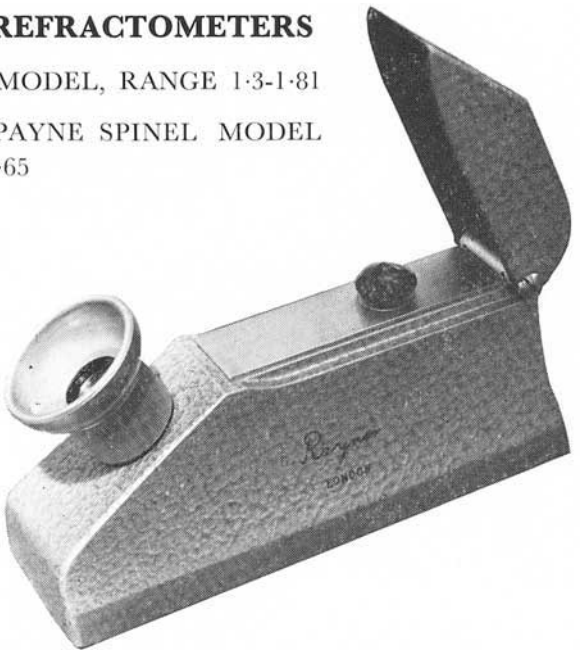

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CONTENTS

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