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"FINGERPRINTING" GEMSTONES and JEWELLERY

by ROBERT WEBSTER, F.G.A.

IN an earlier article[1] the writer referred to "fingerprinting" gemstones and jewellery, that is the recording of various features whereby at some future date the stone or jewel may be re-identified. This, if not quite comparable, is at least analogous to the well-known " fingerprint " identification employed by the Police Authorities in the case of criminals. The value of such an identity service to the police and insurance companies is undeniable, and the same may be said too in respect of those rare cases of dispute with a customer.

Identification services are not new, and in this short article something will be told of the various methods which have been suggested and adopted, and some further ideas based upon modern technical developments. All schemes depend upon the recording of features characteristic of the stone or piece of jewellery ; however, the methods usually employed suffer from the disadvantage that the expenditure of considerable time is necessary in order to prepare the required data, much of which is rendered useless if the stone be recut or even repolished, or the piece of jewellery broken up.

What may well be the commonest " identity certificate " is the jeweller's stock book. Such a book can vary from records containing entries of a most perfunctory nature to one in which the descriptions are full of detail, and often with the notes on important pieces completed with coloured drawings or with photographs. Such books are a veritable mine of information.

In the case of unset gemstones the methods employed depend upon the exact determination of the weight ; the dimensions, usually in millimetres ; the errors, if any, in the junctions of the facet edges, and any inclusions which may be seen under moderate power microscopical examination. For mounted jewellery a similar technique would be followed, noting any irregularities in the setting, and, should the piece contain an important stone, or stones, each would be treated separately, even if they have to be unset for the purpose.

The method used by the well-known jewellers Cartier has been reported in literature[2, 3] and explains a general scheme. The Cartier method entails careful photography of the stone after the main peculiarities, both external and internal, have been examined and noted, the general practice being to photograph the stone actual size and to take three pictures, a top or front view, a back view, and a side view. Figure 1 illustrates such a set of photographs. Enlargements are made if more precise information is needed as to the position of flaws and surface markings. Copies of the pictures are appended to the record containing the other information, a chart being included upon which the special features noted about the stone are made clear diagrammatically. The internal imperfections are photographed in the normal way by the use of a microscope and immersion of the stone in a highly refractive oil. Not only are important stones recorded in this way but every piece of new jewellery made by the firm is photographed. Even in the remaking of a customer's old piece of jewellery to a modern design, photographs are taken of the piece as it originally was and of the new piece when made up, a chart being drawn up accounting for every stone in the original piece and its position in the new jewel.

For many years the Paris laboratory, the Service Public du Controle de la Chambre de Commerce de Paris, has issued certificates of identity for gemstones. As a matter of interest the London

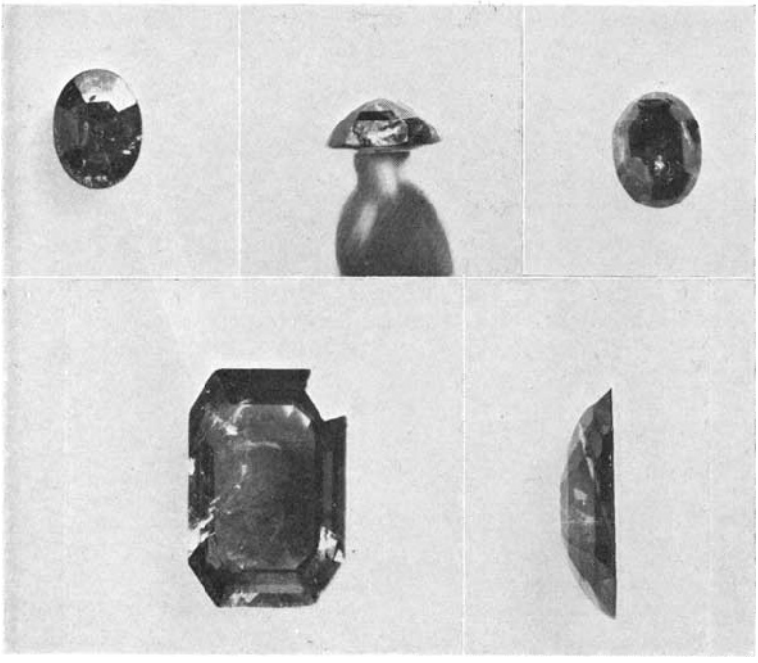


FIG. 1.

Identification photographs of gemstones as prepared by CARTIERS *for identification purposes.*

(Courtesy of Cartiers Ltd.)

laboratory, the Laboratory of the Diamond, Pearl and Precious Stone Trade Section of the London Chamber of Commerce, has not officially carried out work of this kind, but would readily do so if there were a demand for such a service.

The identity certification carried out by the French laboratory consists mainly of a series of photographs. Profile photographs of the stone are taken and a transparent positive accompanies the certificate which is handed to the owner. Figure 2 shows such a picture. Other photographs are taken, such as natural size pictures showing the inclusions (Figure 3), an enlargement showing the imperfections of the rear facet edges (Figure 4), and an enlarged photograph of the inclusions. These pictures are kept in the laboratory file with the report on the stone and are thus ready for future reference.

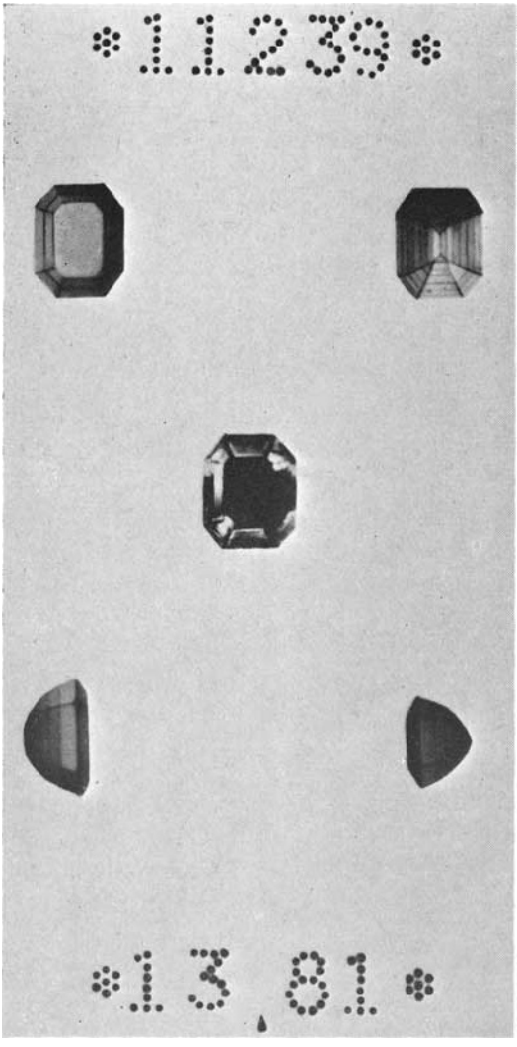


FIG. 2

External identification picture of an emerald weighing 13·81 *carats. This is a reproduction of the transparant positive which is given to the customer by the Paris Laboratory. Actual size.*

What is probably the most ingenious system for an identity service for gemstones is that devised by Aldrich and Davey of California, U.S.A.[4] The scheme involves the itemization of the salient features ; colour, outline, style of cutting, errors of facet junctions and internal imperfections. These features are entered on an index card by a system of code letters and numbers,

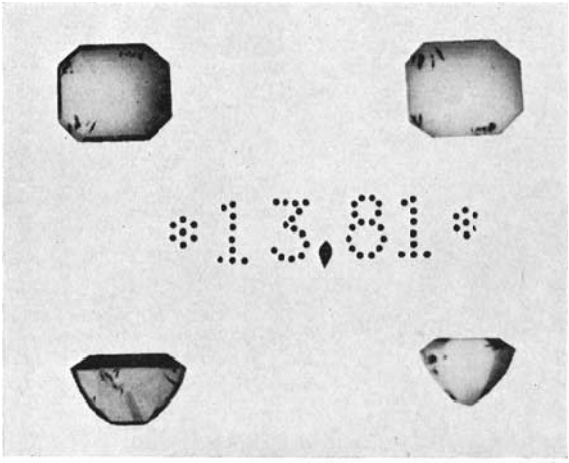


FIG. 3

Internal identification picture of the same emerald as Fig. 2. This is kept in the file at the Paris Laboratory. Enlarged magnified pictures are also kept. Actual size.

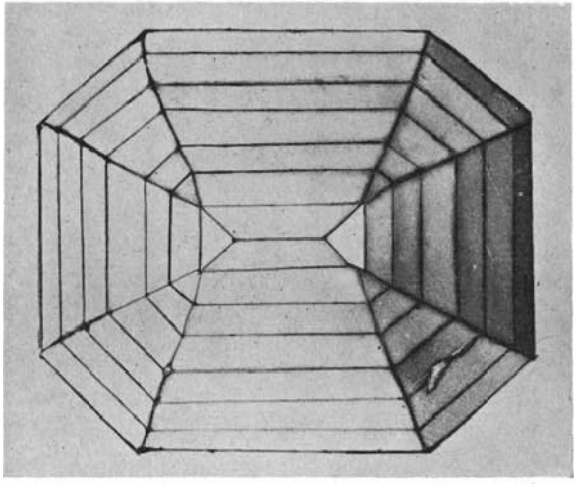


FIG. 4

Enlargement to show the imperfections of the facet edges of the same emerald as shown in Figs. 2 and 3. Paris Laboratory picture.

which are recorded as symbols, some of which are fractions. A full description of the method needs a long article and cannot be given here. It is the writer's opinion that, unless for very exceptional stones, the system proposed is far too time-consuming and is commercially unworkable. The idea behind the codifying of the features shown by the stone is that such codings may be telegraphed. One interesting and useful idea incorporated in this scheme is that the inclusions may be listed and oriented by a system of triangulation at a given magnification. A communi-

cation from the Director of the New York Laboratory, the Gem Trade Laboratory of the Gemological Institute of America, tells that he, assisted by Mrs. E. Miles, tried out the Aldrich & Davey system and found it far too complicated and that it could be made meaningless by slight repolishing.

The Gem Trade Laboratory at New York has not been called upon to issue identity certificates as such, although a certain amount of work in the plotting of inclusions for members and students has been carried out. This is done in duplicate on a diagram and is mainly for the purpose of arriving at a perfection grade for diamonds. The scheme employed by Tiffany's of New York merits comment. A special camera devised by Bruce D. Eytinge is used ; this produces a spot reflection pattern on a photographic film of the reflections from the facets of the stone of a narrow beam of light. The Eytinge camera and the method of its employment have been reported upon in the pages of this journal(5). It is understood that all stones above a certain weight are so photographed by Tiffany's. A similar scheme had earlier been suggested by the Dutch worker Bolman.

Basicly the requirements of an identity certificate for a gemstone are as follows :—

1. An identification certificate certifying the nature and accurate weight of the stone ; *e.g.*, a general certificate as issued by the London Chamber of Commerce laboratory.
2. Accurate measurements of the diameter in round stones, the length and width in oblong or oval stones, and in all cases the maximum depth. These measurements should preferably be made in millimetres and can conveniently be carried out by the use of a micrometer screw gauge or a suitably calibrated caliper stone-gauge.
3. Any irregularities in the cutting of the junctions of the facet edges, which may be denoted by coding, or may be better recorded photographically. Ordinary straight photography of the stone, with subsequent enlargement, is the method employed in the Paris laboratory. In such a process the facet edges of the stone may need to be inked in order to show up clearly. What may well be a simpler and less time-consuming method would be to employ the immersion-contact photographic technique reported upon by Anderson(6). This

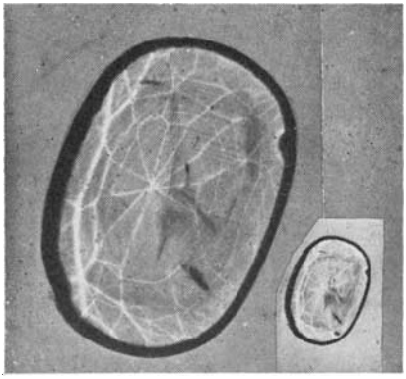


FIG. 5

Immersion contact pictures (actual size and enlargement) of a sapphire, showing the facet edges and inclusions.

method, however, would be unsuitable for those stones of high refractive index, such as diamond. Using an immersion liquid having a refractive index approximate to, but not too near, that of the stone, the facet edges will show up clear and distinct. True, the rear facet edges show up best in such a picture, but these alone will in general supply sufficient evidence. A film should be used in preference to a direct print made on ordinary " gaslight " or bromide paper, as from a film any number of prints can later be made should the identity data require to be circulated. An advantage of this method is that not only can enlargements be made, which are very necessary in order to see clearly the defects in cutting, but a contact print will show the stone actual size, and, further, such contact pictures, and enlargements from them, may well show the major internal imperfections also. Figure 5 illustrates these points.

4. The recording of any inclusions. These will best be dealt with by photomicrography. The magnification of the picture should be given, and, if possible, the relation of the inclusions to the facet edges should be recorded. If three inclusions can be arranged so as to photograph in one plane, the distances between these can be measured by the use of an eye-piece micrometer (Figure 6). On the finished print, or on an enlargement of it, lines could be drawn from the centre of one inclusion to the centres of the other two and by the use of these lines the angles between the inclusions may be measured with a protractor. This would provide valuable additional data.

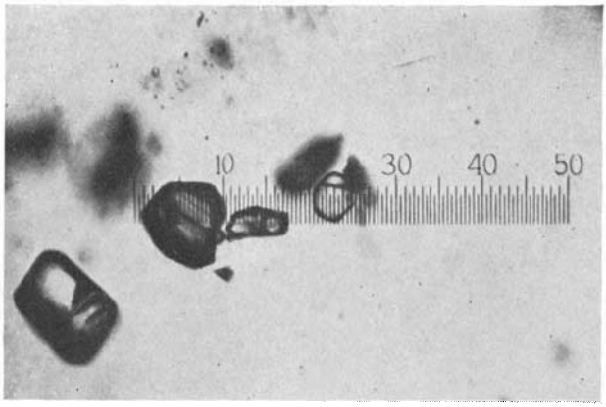


FIG. 6.
Inclusions in a Burma ruby, as seen with micrometer eyepiece scale superimposed. As the two large inclusions superimposed on the left hand end of the scale cover 17 *full divisions and as each of these divisions equals* 35·5mμ. (*Thousandths of a millimetre*) (*calculated from stage micrometer*), *then the inclusions are together* 603·5mμ. *or* 603·5/1000*mm.*

In the case of pieces of jewellery set with many cut stones of small and moderate sizes, the methods outlined would prove far too time-consuming and be uneconomic. The jewel, except for any important stone or stones would, need to be considered as one piece.

Much valuable jewellery to-day is set with a great number of round and baguette diamonds, either alone or in conjunction with rubies, sapphires, emeralds or other coloured stones. The writer suggests that advantage might be taken of the differential luminescent response to long-wave ultra-violet light. Diamonds, unlike most other luminescent gemstones, show a great variation in the intensity (and even colour) of the fluorescent glow. This glow can be photographed by straight photography providing that a suitable ultra-violet absorbing filter be placed over the camera lens. Such filters are Kodak " Wratten " 2B or Ilford " Q." According to O. Bloch[7] ordinary, non-colour-sensitive plates are best for this work.

Experiments carried out by the Raman School at Bangalore, India[8], have shown that longer exposures will cause the more weakly fluorescent diamonds to affect the photographic plate, for, unlike the human eye, the photographic emulsion builds up an image with increased exposure to light.

FIG. 7

Diamond double-clip taken in ordinary light. Actual size.

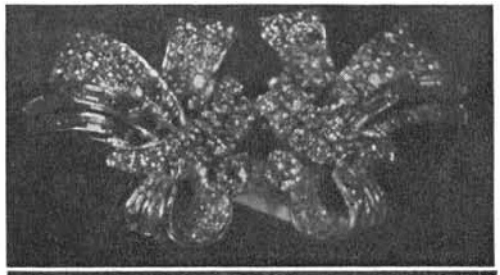
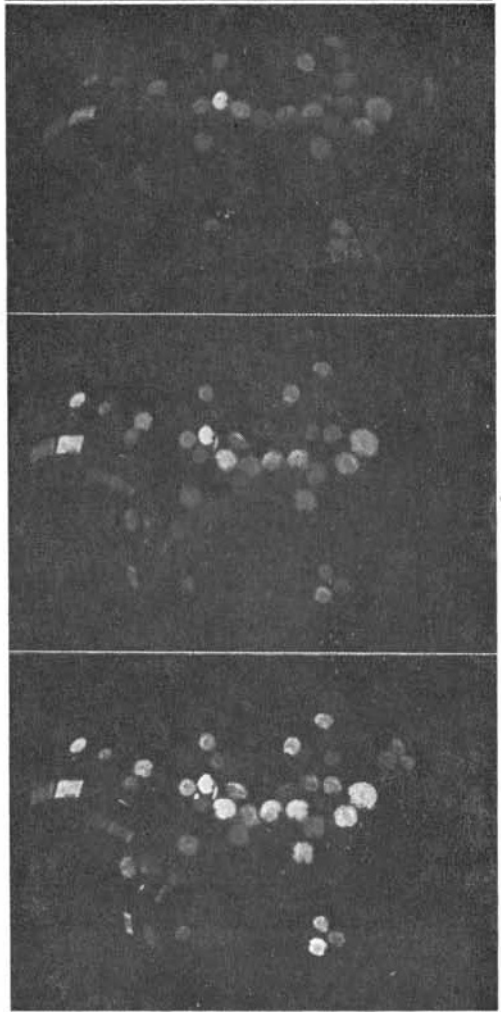


FIG. 8

Photographs of the fluorescence of the diamonds in a double clip brooch.



$2\frac{1}{2}$ *seconds exposure*

10 *seconds exposure*

40 *seconds exposure*

Taken on Ilford "Selochrome" with Kodak "Wratten 28" filter over camera lens. Actual size.

Fluorescence photographs of a diamond double-clip brooch containing one hundred and twenty-two diamonds, ninety-two being brilliants and thirty baguettes, were taken. Figure 7 shows the brooch actual size photographed in ordinary light. Figure 8 shows three different lengths of exposure of fluorescence photographs of the glowing diamonds when in a beam of long-wave ultra-violet light. Short-wave ultra-violet light will produce similar results, but in the case of diamonds the glows are not usually so strong and the time of exposure may need to be longer. Experience alone will tell what exposure is necessary, but it is usually quite short considering that the photography is carried out in darkness, the only light being from the glowing stones. If fluorescence photographs are incorporated in an identity certificate it is important that the photographic conditions are included, for, if the production of comparison photographs is required at a later date, a similar ultra-violet source and similar films (or plates) must be employed, and also similar exposures must be given.

Even one picture, such as the third (longest) exposure shown in Figure 8, may be all that is necessary, as it is extremely unlikely, indeed it would be practically impossible, to fabricate a facsimile piece of jewellery having diamonds emitting a similar intensity of response to ultra-violet light in similar positions in the jewel. As explained, further confirmation could be obtained by the method of differential exposures ; this latter fluorescence photography may well have a great value in the identity certification of large single diamonds.

No piece of jewellery has the metalwork made precisely accurate ; the holes for the stones rarely have their internal edges completely symmetrical, and these defects may be shown up by an enlargement of a direct x-radiograph, or even by the enlargement of a contact photograph. Figure 9 shows such an enlarged x-ray photograph, which would give considerable assistance in the future identification of the piece.

In the case of the identity of pearl necklets reference must be made to the Herz-Matrix system[9]. In this system each single pearl in the necklet is classified as under :—

(*a*) The weight of the pearl in grains.
(*b*) The colour.
(*c*) The shape.

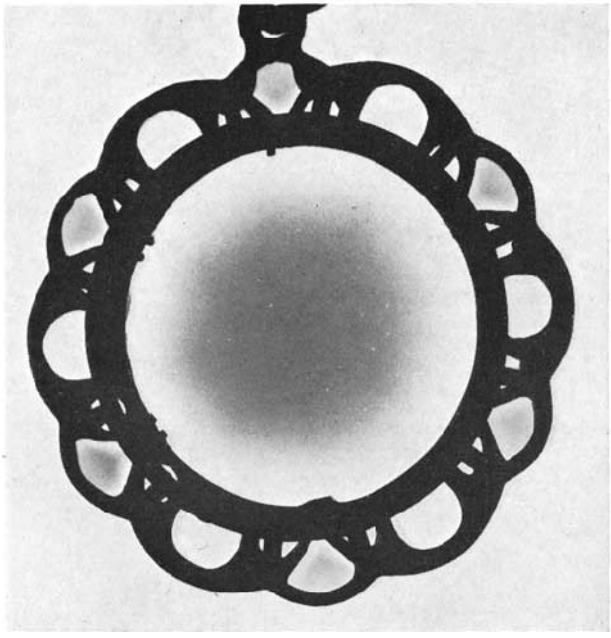


FIG. 9

A direct X-ray photograph of a euclase and diamond pendant showing the irregularities in the metal work. Enlargement is approximately three times natural size.

(*d*) The measurement of the outer layer.
(*e*) The measurement of the second layer.
(*f*) Internal faults seen in the interior of the pearl.

The data for the last three items in the classification are obtained by the use of the " Perlometer," a special microscope for the examination of pearls devised by Dr. H. Michel and Prof. G. Riedl of Vienna. The French " endoscope " could be similarly employed. The data so obtained are entered on a suitable record card but the recording method is time-consuming, and it is suggested that for practical purposes the usual trade " pearl statement " used in conjunction with a direct x-ray picture (skiagram) would give sufficient data to furnish an identity certificate.

In penning these notes the writer is sensibly cognizant of the fact that recutting or slightly repolishing a cut stone would

invalidate many of the diagnostic features, and that the breaking up of a piece of jewellery would completely destroy the identity of the jewel, if such a piece of jewellery had been considered only in its entirety. Recutting or repolishing a gemstone is rarely attempted by the thief, although it may be carried out by the "fence." In any case the job has usually to be carried out by a third party who may well be a dangerous witness should the police authorities become interested in individuals. While recutting or repolishing will alter the exact weight and size (very slightly in the case of repolishing) and possibly alter the irregularities of the facet edges, the internal features and the fluorescence will not alter.

If the jewellery is broken up, then, apparently, every detail is lost. This may not be wholly so. There have been cases where the thief has broken up the jewellery and sold the metal but has not had time or for other reasons has been unable to dispose of the stones (or conversely, the metal). In such cases knowledge of the weight of the metal, or of the stones, both of which would be known by the maker if a satisfactory stock book was extant, and knowledge of the fluorescent characters of any diamonds in the piece, if known, would be invaluable when the question of guilt and the question of ownership are debated.

No one method will give a completely satisfactory answer to the problem of the production of a perfect identity certificate. The procedure adopted must vary according to the nature of the subject, but must contain as many details as are possible to describe accurately. The fact that a perfect identity certificate may be an impossibility does not imply that any certificate containing some data is of no value ; such a document has infinitely greater value than nothing at all.

In conclusion it is the writer's duty to tender thanks to those who have assisted so greatly in the preparation of this article, particularly to Mlle. Dina Level of the Paris Laboratory ; Mr. Lovibond of Messrs. Cartier Ltd. ; Mr. G. Robert Crowningshield of the New York Laboratory ; Messrs. H. Landsberg (per Miss G. Landsberg) for the loan of the diamond clip used in the fluorescence photography ; and to Mr. B. W. Anderson for the loan of the euclase pendant which is the subject of Figure 9, and for critically reading through the draft copy.

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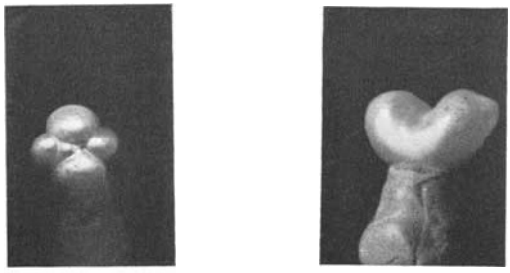
TWO UNUSUAL PEARLS



Photographs (actual size) of two irregular-shaped pearls submitted by J. N. Dave, F.G.A. India. The pearl in the shape of a cross weighs 27.8 grains, and the crescent-shaped one, mounted on a plasticine cone, weighs 50 gains and has a silvery lustre.

GEMSTONE MYSTERIES

by NIGEL W. KENNEDY, F.R.S.A., F.G.A.

MOST people possessing an average knowledge, or ignorance, of the characteristics of gemstones, are surprised to learn that garnet is ever known in any other colour than red or purple, and that diamond occurs in most colours or tints. They are equally surprised to find that in this country it is unusual to see really blue-white diamonds for sale because we cannot usually afford to buy them. The gemmologist on the other hand, is aware that garnet, for example, exists in many colour varieties ; red, purplish, red-brown, orange-brown, orange, yellow, green, and black, but many of these varieties are much less common than one might believe from the descriptions in text books referring to them.

Amphigene, which is an interesting mineral existing in two forms, is also known as white garnet, although it is not strictly a garnet, and is not commonly met with. What has never yet been discovered is a *blue* variety of garnet, which seems rather strange, and this fact gave rise to the attractive title of a mystery story " The Blue Carbuncle " written some years ago. Amphigene, also known to the mineralogist as leucite, is not usually found in gem quality, and indeed the writer has been informed that it does not exist as a gemstone, but D. S. M. Field records it as occurring in Ontario, and that it has been cut locally as a gemstone.

Another member of the garnet family that seems to be less common than one might have supposed, is the humble pyrope, which is often confused with almandine. The true pyrope when compared with almandine, is seen to be quite a different colour, and its characteristic fiery red, from which its name is derived, does not really resemble the more subdued crimson or purple almandine. Other collectors have told me that they had some difficulty in obtaining a specimen of true pyrope, the reason being, of course, that the two minerals merge imperceptibly into each other, according to the preponderance of the MgO or FeO molecule, and the refractive index is controlled by the chemical composition, so that while a pure pyrope should have a R.I. of 1·74, and almandine up to possibly 1·82 a stone giving a reading

of 1·76 may be either mineral, and since the absorption spectrum of almandine is so strong and the spectroscopic test so delicate, the pyrope spectrum is often masked. This also applies to spessartites, which may contain sufficient of the almandine molecule to mask its own spectrum completely. An opportunity of examining a large number of garnets, particularly spessartites, has not yet been possible, but the writer is assured that the above observations are factual.

These varieties are a few of a small group of gemstones that may not be considered very rare, but which appear to be elusive. Some text books infer that they are commonly met with, but general experience does not support this. The following observations refer to gem minerals that I have so far found difficult to obtain, or which have not yet been traced. Readers may like to compare these remarks with their own experience.

A stone that is referred to almost casually in several text books and other sources of information, but which is not included in any collection so far seen, is the green variety of the mineral topaz. Church[1] definitely lists it among the colour varieties of topaz, and Herbert Smith[2] has suggested that its apparent rarity may be due to its similarity to aquamarine of nearly the same tint. As a gemstone green topaz is not recognized in the trade, and is therefore unsaleable, and hence might be included with green aquamarines either from ignorance or choice. The celebrated Scottish mineralogist Heddle[3] lists green topaz as a Scottish mineral that occurs in the Grampians and elsewhere, which definitely settles any question as to its existence. Text books do not suggest that blue topaz is a rare stone, yet the fact is that it is seldom seen, and brown topaz also appears to be a rare colour variety.

Odontolite is another gemstone which seems rather shy of appearing in public, although it has been stated that much of the turquoise in circulation some years ago was in fact bone-turquoise, a variety of fossil bone or ivory, stained naturally or artificially by copper compounds. Not much has been encountered by gemmologists of considerable experience. A small turquoise recently examined exhibited very strong fluorescence under ultra-violet light and it was thought that this might indicate an osseous or dentine origin, but on examination it was found to be natural

turquoise and the suggestion has been made that the fluorescence might have been due to the use of some detergent in cleaning it, which has not yet been verified.

Among other stones that have been difficult to trace, was the variety of opal referred to as " girasol," and sometimes mentioned in gemstone literature. For example, Heddle has stated that girasol forms one of the layers, together with cacholong, in some of the beautiful Scottish agates found in Montrose and other localities. I could never find a specimen in any collection, nor discover anyone who possessed one or could define it with any certainty. Most references failed to describe the mineral, which was stated to be obtained from Queretaro. However, I recently came across the following which may be of interest to other collectors who have had the same difficulty. This occurs in a little-known and interesting text book, "Manual of Precious Stones and Antique Gems" by Hodder M. Westropp (London, 1874)(4). " Fire Opal—Is a rich hyacinth-red variety of opal from Mexico. It is called ' Girasol ' or sun opal."

Hyalite is another uncommon variety of opal, rarely seen even in collections. I was offered some minute specimens—little lenticular objects which I spurned, in the belief that they were inferior, but I soon realized that it is unusual to find this mineral in anything but small specimens.

A gem of considerable rarity, but frequently referred to in text books, principally owing to its famous dichroism, is alexandrite, which is very seldom seen now.

It may not be out of place to mention simulations of alexandrite which are met with under the classification of " synthetic alexandrites " but which are almost invariably synthetic corundum, of a purple-greenish colour, fairly strong dichroism, and which do not actually resemble genuine alexandrite. The other " simulation " apparently sometimes occurring in trade under the same name (that is, " synthetic alexandrite ") is actually synthetic spinel. Only one specimen has ever been seen by me, and this was a sickly yellowish-green colour which was even less like any true Alexandrite, and could not possibly be confused with it.

Most text books give the impression that both orange and green spinel are relatively common ; in fact, the impression was gained that the green mineral chlorospinel was quite commonly encountered, and that the orange-red " rubicelle," to use its

obsolete name, was plentiful. This does not appear to be the case, as Mr. K. Parkinson states that during his last visit to Ceylon he was only offered two green spinels, and upon examination both were found to be synthetic. Yellow spinel—except as a synthetic—is also most rare, while the colourless variety is seldom found in nature.

The rather attractive yellow variety of beryl, known as " heliodor," is another stone that does not seem to be very common, possibly because it may be confused with other similar minerals. For some years it was lacking from my collection until a friend sent me several, when I remembered another collector who had mentioned some difficulty in securing a specimen. When I offered him one he asked if I had any objection to his testing the gem, and he explained that in the course of several years he had been sent at least a dozen different minerals under the name of " heliodor " by reputable firms who had themselves accepted the stones from their dealers without question, but that they all proved to be citrines, yellow corundum, topaz—but not beryl, and he was very glad to find a genuine heliodor at last. This emphasizes the fact that large firms obtain supplies from dealers who in turn receive them in good faith without test as being the minerals described, and that all too frequently it has been the practice to identify such stones by sight and general experience alone.

" Transvaal jade " is yet another stone which is mentioned quite casually in text books as of sufficiently common occurrence to be confused with jade and nephrite, yet there is reason to believe that it is very local in occurrence (as a massive variety of green grossular garnet) and even in South Africa it is not commonly seen. I have only seen one specimen myself, of a very pleasing green shade, and texture not unlike jade.

Microcline is another unusual gemstone, though more common than " transvaal jade," but the only variety seen is a bluish-green, in the form of polished cabochons ; the other colours of this mineral—red, yellow and blue—are probably very scarce and have not yet been seen by me.

Kyanite is also most unusual as a cut stone, probably because while the blue variety is moderately plentiful in the massive form, gem quality is rare, and only small cut stones are usually possible.

Green aventurine quartz makes attractive gems which are sometimes available in various forms, but the red variety is much

less common, although spurious paste " imitations " appear from time to time, and their bright red colour and sparkling spangles of brass make them very garish and vulgar. The name is often spelled " avanturine ". " Aventurine feldspar " (sunstone) is also far from common, and makes quite attractive cabochons, but is seldom met with.

The various naturally-occurring forms of silica produce a much greater variety of minerals in sundry colours, than any other mineral, as quartz, chalcedony (including the agates and mochas, etc.,) and the opals which will compare in beauty with any other representative of the Mineral Kingdom. Some of these are very plentiful while others are relatively uncommon, or even very rare. For example, morion, the nearly-black form of smoky quartz, does not appear to be common as a cut stone, even in Scotland. The deep brown, or honey coloured semi-transparent varieties which merge into cairngorm are much more usual. There is also a steel-blue-black variety of amethyst-morion, something like blue diamond, of which I have only one specimen and have seen few.

In the gemstone collection of the Geological Survey Museum at South Kensington there are two large and magnificent specimens of heat-treated quartz, which have a fine red-orange-brown colour and are transparent and free from flaw. This appears to be a most unusual and lovely colour and so far any similar stones have not been traced. Red quartz is also quite a rarity, and I have yet to see one either as a mineral or faceted stone ; this is, of course, referring to the transparent mineral mentioned by Heddle as apparently of usual occurrence in various parts of Scotland, notably the Grampians, and not to the rich red, opaque ferruginous quartz which is found in perfect crystal form at Santander in Spain, and which I have never seen cut as a gem.

Pink or rose quartz, which is sometimes of quite a deep shade, does not appear to be very commonly encountered, particularly as a gem. It is among the minerals found in Scotland, and listed by Heddle and others. Most text books state that rose quartz always occurs in the massive form, and never as isolated crystals. This is not strictly accurate since I am happy in the possession of a fine crystal. Blue quartz is yet another mysterious mineral, and in fact it is apparently found in two quite different varieties, namely the substitution product after the mineral crocidolite, in which asbestos fibres are replaced by quartz, with retention of the original

blue colouration, and which has been named " sapphirine quartz." A very fine specimen as a trap-cut gem is to be seen in the entrance hall of the Natural History Museum, South Kensington. I have never seen the other variety, which I understand is more like blue topaz in appearance, but the following description by Westropp[4] seems to refer to this variety : " Blue Crystal—Water-worn pebbles, of a beautiful blue colour, are found in France in the stream of Rioupezzouliou, near Expilly, in Auvergne ; they have been called saphirs de France, or saphirs de Puy-en-Velai."

Two other minerals have proved difficult to find, although not usually described as particularly rare, namely, colourless tourmaline and the dark blue variety of tourmaline, sometimes called indicolite. I have examined many specimens submitted for approval, and found that the " colourless " examples were invariably of a green or pink tint. What can one make of the people who submit deep blue-green tourmaline (not green-blue) of the colour formerly known to the trade by the now obsolete name of " brazilian emerald " and which cannot, by any stretch of imagination, be described as blue ? Some have even insisted that such stones were blue, and that they were definitely indicolite, and that the green tint (if seen) is purely a matter of opinion. In one parcel some fifty " indicolites " of 3 to 4 carat were received, but examination showed that only one was blue, the remainder being blue-green, and easily distinguished at a glance.

The reader is reminded that the observations made in this article are all in good faith, but are the result, in general, of my own personal experience, and that, through not being actually engaged in the gem trade, I have lacked the opportunity of examining vast numbers of stones, which some dealers and others have had, and that many stones might otherwise have been found more easily. On the other hand, other collectors, including many in the trade, have experienced much the same difficulty, and in actual fact, I have often had the pleasure of locating unusual specimens for fellow-collectors of wider experience.

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TWO DANISH GEMMOLOGISTS

by O. DRAGSTED, F.G.A.

CALLING a seventeenth century scientist a gemmologist is admittedly an anachronism.

The word "gemmology" was coined just over 140 years ago and covers a specialized science extracted from mineralogy, crystallography, natural history, optics, physics, geography, etc., whereas a scientist in the seventeenth century did not study within such narrow limits; he was a person of great and varied learning, a polyhistor. He might very well be a mathematician, astronomer, surgeon and theologian in one person. So was the case with Rasmus Bartholin and Nicolaus Steno. They touched upon many scientific subjects, which were to receive, later on, the suffix "-logy" and thus be established as separate branches of science.

RASMUS BARTHOLIN (1625 Roskilde-1698 Copenhagen) belonged to a family which has bred many outstanding scientists. He obtained his master's degree at Copenhagen University and studied several years in Leyden at the famous new university where so many prominent scholars met at that time. He was here given the task to publish van Schooten's lectures on Descartes. He was most fascinated by the great French savant, whose important results in mathematics and geometry as well as his philosophy influenced Bartholin's future works. In Paris Bartholin studied mathematics and became friends with de Beaune; in Padua he won the degree of Medical Doctor; and he also studied in England, after which he was made professor of mathematics and extra-ordinary professor of medicine in Copenhagen in 1657; later on he became rector magnificus several times and for 18 years he was Justice of the Supreme Court.

His greatest scientific achievement was the discovery of double refraction in Iceland Spar; in his own words the spar was *dis-*

diaclastic—gem students are happy that this term soon became obsolete. In 1669 he published " Experimenta crystalli Islandici disdiaclastici " (in 1922 appeared in Leipzig a German translation entitled " Erasmus Bartholinus : Versuche mit dem doppelbrechenden isländischen Kristallen "). He gives a very good description of the crystals and the results of each of his experiments, and as a good pupil of Descartes he accepts nothing which he has not seen with his own eyes ; he availed himself of Descartes' explanations about the behaviour of light, but he failed to find out the laws governing birefringence, and so did Newton. But Huyghens who had hesitated to publish his wave theory now became convinced that his own explanation was the right one, and so he ventured to publish this most valuable contribution to the understanding of the movements of light.

NICOLAUS STENO (1638 Copenhagen-1686 Schwerin, buried in Florence) was the son of a well-to-do Copenhagen goldsmith, Sten Pedersen ; latinized his name was Nicolaus Stenonis, but most authors call him Steno.

Steno was a most remarkable spirit : an anatomist famous for his demonstrations and discoveries (" ductus Stenonis " from ear to throat ; functions of tears, lachrymal gland and canal) ; a geologist with a very sharp eye and power of deduction ; and a searching theologian who eventually after deep consideration was converted to the Catholic faith and ended his days as bishop much too early because of a too ascetic life.

He studied in Copenhagen and Leyden, and stupid nepotism hindered his being made a professor at the Copenhagen University. Instead he went to the Medici Court in Tuscany. His main work was " De solido intra solidum naturaliter contento dissertationis prodromus," which was published (with many printing errors) in Florence, 1669, and (in a much better edition) in Leyden, 1679 ; an English translation appeared in London, 1671, of which the only copy known is in the British Museum.

In this " prodrome," or preliminary treatise, on solid bodies which are naturally embedded in other solid bodies, he is the first one to point out that the soil or crust consists of different layers ; what is now dry land was at one time the bottom of the

sea. He proves this through the existence of fossils, shells, etc. He was led into these thoughts while dissecting a shark ; the teeth were strikingly alike some funny " sea tongues " or " glossopetrae " in the cliffs of Malta. So he set to study the soil of Tuscany and found sufficient evidence to support his theory of geological periods. In his book he also describes various crystal forms, and his strict mathematical way of thinking together with his power of imagination made him throw overboard the old theory that crystals absorb food from the ground through their interior body. They consist of imperceptibly small particles and grow in liquids by the outward addition of further particles. He also saw that the angles of the same crystals must be the same from whatever locality they came. And he maintained that if a " dissolving liquid " could be found, rock crystal could be dissolved into a liquid and again made to crystallize.

Later generations have called him the father of geology, and in 1881 a congress of geologists in Bologna undertook to erect a monument for him ; over one thousand scientists sent in contributions, and a cenotaph was raised near his tomb. The short treatise he published because the Grand Duke who supported him was impatient. But Steno did write a more complete treatise, which he handed over to one of his pupils. This manuscript is not known and has no doubt been lost.

Gemmological Abstracts

DAKE (H. C.). *Opal in Oregon.* Mineralogist (Oregon), pp. 68–74, February, 1954.

Short account of the occurrence of precious opal in Lake County, Oregon. The opal field has been known for forty years, but few gems of commercial value have been found, though there is much common material. S.P.

JEANNELLE (H. F.). *The gems of Madagascar.* Mineralogist (Oregon), pp. 85–90, February, 1954.

A commentary on the most important gems of Madagascar by a resident mineralogist. Nearly all the gems occur in the granite pegmatites in various parts of the island, and a feature is the occurrence of gems in colours that are unique. It is suggested that some of the rare colours are due to long exposure to the gamma radiations of associated uranium minerals. The problem is complex and when commenting upon a black beryl, found in contact with radio-active euxenite and fergusonite, and a blue beryl, with numerous euxenite inclusions, the author suggests that there may be some other cause, and investigation is being made into the cause of colour in Madagascar gems. S.P.

COX (H. H. JR.). *Noble Coral, Gem of the Mediterranean.* The Lapidary Journal, Vol. 7, No. 6, pp. 494-502, February, 1954.

This interesting article is mainly devoted to the fashioning of coral to form ornaments and gems and thus, as is to be expected, is chiefly concerned with the red coral *Corallium rubrum*, the white and often beautiful corals of the East being only just mentioned.

It opens with a brief account of the historical uses of and the old mythical beliefs in coral. The old view is given that coral is the hard skeletal structure of certain marine polyps, whereas it is now known that it is secreted by the living basal disc, containing freely communicating tubes which also communicate with the central cavity or exterior of each living polyp so that the whole colony forms a single living organism. The whole of the basal disc is known as the coenosarc and it alone forms the coral which is

therefore a steadily increasing base upon which the polyps grow rather than a skeleton. In the red *Corallium rubrum* the coenosarc is arranged as a tube secreting coral on its inner surface and covered by the minute (1/20th-1/10th inch) polyps on its outer surface. Some of the lateral polyps may take on the function of increased coral formation and so give rise to lateral branches. A good account follows of the composition but in the description of the appearance no note is made of the parallel, longitudinal bands of darker colour which is the main distinction from imitations.

A description is given of the sites of production, the methods of obtaining, and the older and modern markets for the material, the latter being mainly around the Mediterranean and in India.

The most detailed and helpful account is that of the fashioning of the material, and stress is laid upon the brittleness of coral so that great care must be taken in sawing lest a valuable piece be shattered. For this portion alone the article will well repay careful perusal by every amateur or professional worker in coral.

J.W.

Edelsteine aus Idar-Oberstein. Precious stones from Idar-Oberstein. Published by the Idar-Oberstein Chamber of Commerce, under the direction of Dr. W. Holstein, Jr., text by Prof. Schlossmacher. 50 pp., 1 map, 1 comprehensive table, numerous photographs, several coloured illustrations and 2 colour plates.

This very attractive booklet is profusely illustrated, some of these illustrations being coloured and fairly representative. The text deals in popular fashion with the more important groups of gems and synthetics and there is also a short chapter on pearls. The map shows the origin of gems, the table gives name, chemical composition, crystal structure, hardness, spec. gravity, refractive index, colour, other optical properties and origin. Astrology and magic have not entirely been discarded which may have been thought to be pardonable in a propaganda booklet of this kind. A very pleasing publication.

W.S.

GÜBELIN (E. J.). *Synthetischer roter Spinell.* Synthetic red spinel. Zeitschr.d.Deutsch.Gesell.f.Edelsteinkunde, 1953/54, No. 6, pp. 4–9.

The author was perturbed by finding ruby-red polished spinel, submitted for examination, which had been cut from boules. Two years ago he published the reasons why to his mind a red synthetic spinel was not a commercial proposition (Gems and Gemology, Summer 1950, p. 307). In the Winter 1950 number (p.362) of the same paper Crowningshield and Holmes reported on a synthetic spinel octahedron grown on a palladium disc. These publications and private correspondence with Mr. B. W. Anderson led to successful experiments, gratifying no doubt to the scientist in every gemmologist but not quite so desirable in commercial respects. Altogether six specimens were available. The best example of an attractive ruby red hue was brilliant cut and displayed a very lively fire. All specimens looked more like genuine rubies of poor to fine hue than natural red spinels, especially as the yellow tint of the natural stone was missing. The chemical composition is $MgO.Al_2O_3$ (Ratio 1 : 1 as in genuine spinel and in contrast to the ratio 1 : 3 . 5 in other synthetic spinels). X-ray diffraction powder diagrams were identical for both synthetic and natural materials, *i.e.*, the lattice constants were the same. Specific gravity and refractive index were practically the same. Observation with the spectroscope of the fluorescent lines, however, allowed differentiation ; the synthetic material behaving more like ruby than natural spinel (broad band from 6,850Å to 6,900Å flanked by two weaker narrow lines). Microscopic investigation showed gas bubbles similar to those in synthetic corundum and somewhat surprisingly also the curved lines of corundum. They also lacked dichroism and extinction between crossed nicols allowed differentiation in this case. W.S.

CHUDOBA (K. F.). *Aus der Schmucksteinwelt der U.S.A.* Gems of the U.S.A. Zeitschr.d.Deutsch.Gesell.f.Edelsteinkunde, 1953/54, No. 6, pp. 14–19.

The article deals with " gems " like Shattuckite, Howlite, Variscite, Utahite, Augelite, Chlorastrolite, Thomsonite, Rhodonite, Smithsonite, Benitoite and Andalusite. Of Canadian and Brazilian origin are mentioned Peristerite, Sodalite, Cancrinite, Labradorite, Scapolite and Brazilianite. In most cases chemical composition, constants and other properties and derivation of the name are given. W.S.

LAIR (P. H.). *Yours for greater brilliance.* The Lapidary Journal, Vol. 7, No. 6, pp. 512–526, February, 1954. (8 Figs.).

A popular article in forceful language stressing the evident point that the brilliance of a brilliant cut gem is produced by the rays leaving the crown as opposed to the rays merely reflected internally. Dispersion is left out of the discussion deliberately and double refraction is not mentioned. For tourmaline, diamonds, zircon and quartz the author has computed angles between (1) main crown facets and girdle plane, and (2) main pavilion facets and girdle plane, which deviate considerably from those of the conventional or the ideal cut. The author must have been trapped by a table of ideal angles in which crown and pavilion angles have been interchanged. In all the cited cases the conventional crown angles are erroneously stated to be bigger than the pavilion angles ; and the author's computations led to similarly strange results. For brilliant cut tourmalines, zircons and quartzes he suggests bigger angles between crown facets and girdle plane than between pavilion facet and girdle. For diamond he calculates a crown-girdle angle of 32 degrees and a pavilion girdle angle of 37 as compared with the " ideal " 38 and 41 degrees. It is not stated whether the new theory has been put to a practical test. W.S.

Edelsteinausstellung 1954 *in der Schweiz.* Gem exhibition 1954 in Switzerland. Zeitschr.d.Deutsch.Gesell.f.Edelsteinkunde, 1953/54, No. 6, p. 3.

The Swiss Gemmological Association and the German Association for Gemmology are planning four exhibitions during summer 1954. The first exhibition will be held at Zürich from beginning of May to mid-July under the motto " The World of Gems." Berne is chosen for the second exhibition in September and Basle for the third in October. Geneva, too, will have its exhibition. In every case the town authority will be the exhibitor. W.S.

SCHMIDT (PH.). *Magie der Edelsteine.* Magic of the gems. Zeitschr. d.Deutsch.Gesell.f.Edelsteinkunde, 1953/54, No. 6, pp. 10–13. Cont. from 1953, No. 5, pp. 13–16, abstr. Journ. Gemmology, 1954, No. 4, p. 215.

Mentions shortly the " stone of the month," and a few historically well-known stones, *i.e.*, Hope diamond, Koh-i-Nur, Orlow. W.S.

The Diamond Tool Industry in 1953. 7 x 9½ in., 8 pp. Issued by the Industrial Diamond Information Bureau, 32-34 Holborn Viaduct, London, E.C.1.

This report, the ninth in succession, summarizes the main developments during the year 1953. The following fields are reviewed : diamond as a material, properties of diamond, synthesis of diamond, hardness and microhardness, surface finish, fine boring and fine turning, truing of grinding wheels, diamond powders, impregnated diamond tools, sintered carbide grinding, glass grinding and stone working, rock drilling, wire drawing, diamond use and salvage, new machining methods, and jewel bearing production. With each section references are given to literature, a total of 155 references being quoted. This year's report refers in particular to new developments in hardness and microhardness testing, diamond powders, impregnated diamond tools, and diamond use and salvage. The report will be of interest to all those engaged in the use and production of diamond tools. This summary is mainly based on a monthly bibliography that has been published for 10 years by the same organization. Copies of this bibliography can be obtained, free of charge, by those interested in the diamond and diamond tools. **P.G.**

WEAVIND (R. G.). *A process for recovering alluvial diamonds.* Gems and Gemology, Vol. VII, No. 12, pp. 365–366, Winter 1953/54.

Alluvial diamonds, unlike those found in the kimberlite pipes, do not, in many cases, stick to grease, hence the alluvial stones are not so susceptible to recovery by the normal sloping grease tables. This is due to the surfaces being wettable owing to the attraction of water soluble salts with which they have come in contact. This is overcome by treatment of the concentrate with a water solution of oleic acid and the employment of a special rubber " grease belt " which travels across a flat table from two rotating drums. **R.W.**

ELLISON (J. G.). *Testing drilled pearls with ultra-violet light.* Gems and Gemology, Vol. VII, No. 12, p. 367, Winter 1953/4.

It is suggested that by the aid of a beam of ultra-violet light (wavelength not given) projected down the string canal of the pearl,

any luminescence of the layers can be observed by a microscope. By observing the sides of the drill hole it may be apparent that the different layers show different degrees of fluorescent glow. The sharp division between layers would appear at one part only in the case of the cultured pearl. R.W.

WEBSTER (R.). *Gemstone luminescence.* Gemmologist, Vol. XXII, No. 269, pp. 229–231, Dec., 1953, Vol. XXIII, Nos. 270/1, pp. 17–19 and 29–31, Jan./Feb., 1954.

Continuation of the alphabetical series on the luminescent characters of gemstones. The instalments cover the gems from *pearl* to *spodumene*, and include references to the rare species *petalite*, *pollucite*, *scapolite*, and the important species *quartz*, and, natural and synthetic *spinel*. The *kunzite* variety of spodumene shows a photocoloration to green after x-ray bombardment. P.B.

KAPLAN (G. R.). *Procedures for cutting and grading of diamonds.* Gems and Gemology, Vol. VII, No. 12, pp. 355–360. Winter, 1953/4.

A general survey of diamond cutting, with particular stress on cleaving and sawing. The first process in cleaving is to make a V-shaped groove in the correct direction by using successively sharper diamond splinters. A steel wedge is then placed in the groove so that it rests half way down the groove. A tap on this wedge will cause downward and spreading forces which split the diamond along the cleavage direction. Twinned stones cannot be satisfactorily sawed and are better cleaved through the twin plane. Some shapes of crystals are more efficiently cleaved than sawed. " 10 commandments " are given as being necessary for the best production of a cut diamond. Notes are given on the colour grading of diamonds with particular emphasis on the American " colorimeter " and the American Gem Society standards. 7 Figures. R.W.

ELLISON (J. G.). *An unusual characteristic of gemstones.* Gems and Gemology, Vol. VII, No. 12, pp. 368–369, Winter, 1953/4.

Some experiments on the " feel " of gemstones. Large stones were tested by rubbing the table facet with the finger ; smaller stones by rolling between thumb and forefinger. A list is given of this effect of some 36 stones, but only two classifications are given—smooth and sticky. R.W.

DEANE (N.). *Adventures in lapidary work.* Gemmologist, Vol. XXIII, Nos. 270/1, pp. 1–5 and 32–36, Jan/Feb., 1954.

A series of articles (to be continued) on the experiences of an amateur lapidary in the cutting and polishing of gemstones. The author discusses saws and sawing (slitting) ; and the grinding and polishing of cabochons. Tells of the various types of saws and laps the author has tried ; how he has made dop sticks and what cement was most useful. 7 illus. R.W.

ANDERSON (B. W.). *The spectroscope and its applications to gemmology.* Gemmologist, Vol. XXII, No. 269, pp. 218–222, Dec., 1953. Vol. XXIII, Nos. 270/1, pp. 6–9 and 24–28, Jan./Feb., 1954.

The continuation of a valuable series. The historical introduction is concluded with reference to the employment of the spectroscope in astronomy. The Doppler-Fizeau principle is discussed, and the work of Hartley and De Gramont in the identification of the " persistent lines." The theory of spectra is discussed by a short historical survey of the work of the physicists. Emission spectra and their production and the methods of spectrum analysis by their aid are fully described as far as " flame spectra " and the use of the table spectrometer in conjunction with an arc source allows. A graphical method of calibrating the spectral lines seen in a table spectrometer is given. 3 illus. R.W.

LEECHMAN (G. F.). *Thoughts on cause of colour in precious opal.* Gems and Gemology, Vol. VII, No. 12, pp. 361–364, Winter, 1953/4.

A resumé of research work carried out by the author. This work has been reported more fully in the pages of this journal. (Journ. Gemmology, Vol. IV, No. 5, pp. 200–210, Jan., 1954.) R.W.

BULLOCK (H.). *The Great Koh-i-Nur diamond.* Gemmologist, Vol. XXIII, No. 270, pp. 10–13, January, 1954.

A short history of the " Mountain of Light " diamond written by one who has made Indian history his particular study. The stone, said to have been found at Golconda, which was a fortress and is a ruined city, may well have come from the alluvial earth along the banks of the Kristna river. Date of finding of the stone not certain. History of the stone from the time of Tavernier in the 17th century is given. 3 illus. P.B.

LINHOLM (A. A. L.). *Recovery of alluvial diamonds by electro-static separation.* Gems and Gemology, Vol. VII, No. 12, pp. 374–375, Winter, 1953/4.

An account of a method of separating diamonds smaller than 3 mm. from the diamond concentrate by an electrostatic process. The method depends upon the fact that diamonds are very poor conductors of electricity whereas the great majority of the gravel particles are better conductors. The electrostatic separator consists essentially of an earthed electrode and a charged electrode placed opposite each other and fairly close together. A high tension field is maintained between the two electrodes, the charged electrode being of positive polarity. The gravel conductors being relatively good conductors allow their charge to leak away to earth as they pass over the earthed electrode of the separator. In this way they acquire negative potential and are, therefore, attracted towards the positive high tension electrode. The induced charge on the surface of the non-conductive diamonds cannot leak away quickly enough and they retain their positive charge and are, therefore, repelled from the high tension electrode; thus the two groups are separated. R.W.

HUNGERFORD (T. A. G.). *Pearl oyster under the microscope.* Gemmologist. Vol. XXII, No. 269, pp. 213–217, December, 1953.

A general account of the Field Station of the Fisheries Division of the Commonwealth Scientific and Industrial Research Division based on Thursday Island in the Torres Straits. Six varieties of pearl shell are found in the straits, but gold- and silver-lipped shell are the only marketable varieties. Shell and not pearls forms the major commerce. The scientific investigations carried out at the Field Station consist of observations and the recording of the growth of the oyster at all stages of its life, and, in particular, observations of the sexing. It is reported that in the first year of maturity, when the oyster is from 2 to 3 years old, 95% mature as males, but in the next year 50% of these change to females. The reason for this is not known, nor is the actual method of reproduction. The work of the Station entails, also, the investigation of the possibility of using Torres Strait oysters for the production of cultured pearls. 5 illus. R.W.

BOOK REVIEW

POUGH (F. H.). *A Field Guide to Rocks and Minerals.* Houghton Mifflin Company, Boston, 1953, 333 pp. Many illustrations in colour and black and white.

If one scans the shelves in the " Natural History " section of any large bookshop, one will have no difficulty in finding well-illustrated books on wild birds, butterflies, flowers, mammals, fish, trees, and so on, but never a similar type of handbook for the mineral collector. To be sure, there are several good text-books on mineralogy, but none of them are at all suitable for carrying with one in the field as an aid to the identification of minerals on the spot.

This new little book by Dr. F. H. Pough fills this curious gap in the literature for the non-technical enthusiast exceedingly well. It is written by an American, and primarily therefore for Americans, but its usefulness is none the less universal. So far as the reviewer is aware, nothing at all like the " Field Guide " has before been attempted except for one little German book, Börner's " Was ist das für ein Stein," which was published just before the War. Dr. Pough's book is much more informative and truly scientific, and of far more value for the collector.

There are seventy pages of introductory matter. In this, practical advice is given about the simple apparatus and techniques recommended for collecting and testing minerals, in which the neglected art of blowpiping is given a prominent position. The main forms of rocks are described, the physical and crystallographical (but not the optical) properties of minerals are explained, and notes given on their chemical classification, following the order used by the editors of the new edition of Dana's " System." The remainder of the book consists of brief descriptions of all the common minerals and a few of the interesting rarer ones. The descriptions are greatly aided by numerous plates, on which are reproduced no fewer than 254 photographs of typical mineral specimens, 72 of which are given in colour. Opposite each plate is a series of well-chosen and well-executed drawings of the most important crystal habits of the relevant minerals, with a page reference to the text description. In the same way there is a

page reference to the appropriate plate at the head of each mineral description. This cross-referencing is very necessary, as the text and plates are often far apart. The book concludes with a brief glossary and bibliography, and there is an excellent index. This is emphatically not just a pretty picture-book but a working manual by a mineralogist who has a number of qualifications for the task of making a book of this kind. As curator for many years, he had access to the magnificent mineral collection in the American Museum of Natural History, from which most of the specimens photographed were taken. He has travelled widely throughout the world in search of minerals, and is personally acquainted with most of the famous localities, and finally he has first-hand experience of testing minerals by the methods he advocates here, as well as by the more erudite laboratory methods of which no mention is made in this book.

The text abounds in useful practical tips, which make interesting and rewarding reading even for those who have already a considerable knowledge of minerals. Knowing the popularity of ultra-violet lamps amongst amateur mineral collectors in the States, Dr. Pough makes frequent reference to fluorescent effects, but suggests that these can sometimes be far more diagnostic if one takes the precaution to roast the specimen first : a very useful hint. The gemmologist in search of a wider knowledge of minerals will regret the entire lack of optical data and also of determinative tables. But these are quite deliberately omitted by the author for reasons which seemed to him sound in a book of this particular kind—a field guide for beginners.

To anyone interested in collecting minerals from mine, tip-heap or quarry in this or any other country the " Field Guide " would be more helpful than any other book to take along. For those of more sedentary habits who dwell in cities, the book would serve as a valuable companion to walks round a museum collection. The author is sincerely to be congratulated on a really good job of work.

B.W.A.

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A list of books on gemmological subjects which have been published between 1850 and 1953. It is not exhaustive, and does not include articles which have appeared in journals or which have been reprinted as pamphlets.

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ASSOCIATION NOTICES

THE NEW PRESIDENT

Sir Lawrence Bragg, F.R.S., who has been elected as President of the Association in succession to the late Dr. G. F. Herbert Smith, is an eminent man of science, and the son of an equally famous scientist, Sir William Bragg, who was President of the Association from 1937–1942.

The new President has recently taken up his appointment as Director of the Michael Faraday Research Laboratory of the Royal Institution, a post also held by his father. The Directorship carries with it great prestige in the scientific world and provides unique opportunities for research work. Since 1938 Sir Lawrence had been Cavendish Professor of Physics at Cambridge University. Previously he had been Professor of Physics at Manchester University, Director of the National Physical Laboratory, and a Fellow and Lecturer at Trinity College, Cambridge. He is President of the Institute of Physics and a past-President of the International Union of Crystallography.

With his father he wrote *X-rays and crystal structures*, and is himself the author of *The Crystalline State* and *The Atomic Structure of Minerals*.

The Council are grateful that Sir Lawrence has honoured the Association by becoming its fourth President.

GEMMOLOGICAL ASSOCIATION OF AUSTRALIA

The following are Members who have qualified for Fellowship in the 1953 Examination.

The first three positions in Australia were filled by :—

1. R. N. Brown (South Australia).
2. A. Milston (New South Wales)
   G. L. Berkman (New South Wales)

The best Student in each State was :—

New South Wales	*South Australia*	*Victoria*
A. Milston G. L. Berkman	R. N. Brown	H. Blanchard

Western Australia	*Queensland*
B. Sturmer	J. B. Cameron

The Australian Prize goes to R. N. Brown of South Australia and the Stevenson Award for the South Australian Student goes to M. G. Soph.

SIR LAWRENCE BRAGG, F.R.S.

The Association's New President

Of the 53 Students who sat for the Examination, 37 were successful and the complete list is given hereunder :—

NEW SOUTH WALES

M. B. Austin.	P. S. Marcus.	J. F. Schofield.
G. L. Berkman.	A. Milston.	E. G. Sherman.
M. Gayst (Miss).	L. Mulveney (Miss).	M. Smith.
J. D. Henderson.	K. A. Robertson.	J. G. Thomas.
R. B. Manzo.	R. Sawyer.	C. Totterdell.

SOUTH AUSTRALIA

R. N. Brown.	O. W. Kahl.	M. G. Soph.
J. W. Callery.	I. W. Offe.	A. J. White.

VICTORIA

S. Auchterlowrie.	D. Coleman.	B. J. McConnell.
H. Blanchard.	B. East-Almond.	J. Williams (Mrs.).
	H. E. Williams.	

WESTERN AUSTRALIA

J. Anderson.	J. A. Campbell.	W. A. Jones.
B. Sturmer.		E. White.

QUEENSLAND

D. Bell	W. Bishop.	A. J. Byrne.
	J. B. Cameron.	

TALKS BY MEMBERS

Dembo, Victor A. : " Gemstones." North Staffordshire Branch of the Geological Association, Newcastle-under-Lyme, 3rd February, 1954.

Blythe, Gordon A. : " Gemstones." Leigh-on-Sea Rotary Club, 25th January, 1954 ; Young Wives' Club, Leigh, 2nd Febuary ; Young Conservatives, Southend West, 3rd February ; Young Wives' Club, Thorpe Bay, 11th February.

Warren, Frank W. : " Gemstones." Whiteladies Road Contact Club, 15th January, 1954, also to Soroptimist Club, Bristol, 15th February, 1954.

Webster, R. : " Gem materials in watch and clockmaking." British Horological Institute, London, 28th January, 1954.

Gilmer, Charles T. : " Jewellery " and " Historic Gems in the Crown Jewels."

Melrose, R. A. : " Gemstones." Rotary Club of Blyth, Northumberland, 4th February and 4th March, 1954.

Anderson, B. W. : " Gemstones and how to recognize them." Cardiff Naturalists' Society, 18th March, 1954.

COUNCIL MEETINGS

At a meeting of the Council held at 19/25 Gutter Lane, London, E.C.2, on Tuesday, 19th January, 1954, the following were elected to membership :—

FELLOW : Baker, John T. Bristol (D. 1953).

PROBATIONARY : Pearce, Anne M. Old Windsor.

ORDINARY : Harper, John S. Birmingham.
Walker, Professor Frederick. Cape Town, S. Africa.
Wines, Elizabeth D. London.

The Council made the following nominations for Officers for the forthcoming year:—President: Sir Lawrence Bragg, F.R.S.; Chairman: Mr. F. H. Knowles-Brown; Vice-Chairman: Sir James Walton; Treasurer: Mr. F. E. Lawson-Clarke. The Council nominated Miss E. Ruff and Mr. R. K. Mitchell for re-election and Mr. T. H. Bevis-Smith for election to the Council. The Council also considered examination arrangements for 1954.

MEMBERS' MEETINGS

A meeting of members was held at the British Council Cinema, London, W.1, on Thursday, 28th January, 1954, when three films were shown including "In the land of diamonds" and "Light control through polarization."

On 3rd March members met at Goldsmiths' Hall, London, E.C.2, and displayed gems from their own collections.

EXAMINATIONS IN GEMMOLOGY

The 1954 examinations in gemmology of the Gemmological Association will be held as follows:—

Preliminary Papers—	London, Provinces and Overseas: Wednesday, 9th June.
Diploma Theoretical Papers—	London, Provinces and Overseas: Thursday, 10th June.
Diploma Practical Papers—	London and Overseas: Friday, 11th June; Birmingham: Friday, 4th June; Edinburgh: Thursday, 27th May; Plymouth: Friday, 4th June.

MEMBERS' MEETING

Members who were attracted to the first social meeting and individual display of gems of interest, which was held at the Goldsmiths' Hall on March 3rd, found the visit well worth while. The experiment of inviting members to show some of the special items in their collections met with an excellent response, especially as judged by the rarity of some of the stones.

Four members had responded to the invitation to "exhibit." Sir James Walton, the Vice-Chairman, Mr. B. W. Anderson, Mr. Keith Mitchell and Mr. F. Ullmann. And although not by design, the aspects of gemmology that were demonstrated by each of their collections were entirely different and illustrated its many sided appeal.

It might be said that the star stone shown by Mr. Mitchell was the "star" of the evening, for it appears fairly certain that it represents a mineral which in this form has not been described before. The stone came from Ceylon, having been cut because of its natural asterism and being sent to Mr. Mitchell by Mr. F. L. D. Ekanayake, a keen collector whose gemmological knowledge enabled him to recognise the interesting features of the gem. Of a greyish-green colour, the cabachon cut and polished stone was investigated at the Hatton Garden Laboratory where the first findings suggested that it was glass and because of the lead content noted, that it was artificial glass. As a result of this the stone was sent to the well known School of Glass Technology at Sheffield University

for further examination. The University confirmed that the constants found were correct but they further discovered the presence of thorium as a major constituent and that the stone was rather strongly radio-active.

It seems certain that this lead content is an end-product of the disintegration of the radio-active thorium and it is now considered that the stone is a natural mineral of the "metamict" type. Calculations based on its radio-activity suggest that this has been going on for a thousand million years.

Mr. Mitchell also showed some other unusual stones. There was a pair of pale yellow transparent plagioclase feldspars from Utah, U.S.A. They had the constants and composition of labradorite and could be regarded as a new form of that stone. There was a parti-coloured zircon, orange and green.

Sir James Walton brought along a selection of carved stones which he described and suggested that some of the carvings were difficult to explain. One, for instance, showed the figure of a male, wearing only a Greek helmet and with the right leg ending in an uncarved stump. He thought that this, like another carved stone, might have come from the tomb of some Egyptian mummy because of the traces of black patches of material that might be bitumen.

Mr. B. W. Anderson presented another aspect of gemmology with a collection that showed macro-inclusions in quartz. He told how he had bought them some years ago from the family of a Victorian collector whose notes upon them showed how much easier it may have been in one way to be a collector in those days. Thus he had recorded that the price of 3s. 6d. which he had paid for one fine specimen was "very expensive."

A good example of an included moving bubble a quarter of an inch across and preserved for millions of years in its hermetically sealed cavity could be easily seen in one specimen. Other examples had crystals of rutile, tourmaline and pyrites in them. Asbestos material which was on the way to becoming a quartz catseye could be seen on another, while there was a large ghost crystal of quartz with an inner crystal of milky opaqueness which contrasted with the later clear growth. Other specimens had crystals both inside and outside.

Mr. F. Ullmann had among his stones a fine specimen of phenakite from Russia, a parti-coloured quartz, sphene and a dark green garnet. An unusually large specimen of black coral, exhibited by the Secretary and recently described in the "Journal" by Mr. Robert Webster, was another choice specimen which interested the members who had braved the downpour of rain.

OBITUARY

It is with regret that we have to record the death on 20th March of Mr. Arthur Tremayne, aged 74. He was the Editor of the *Gemmologist, Industrial Diamond Review, Horological Journal* and *Goldsmiths' Journal*, and also Governing Director of N.A.G. Press Ltd.

Mr. Tremayne, in 1909, included the study of gemmology in the course for retail jewellers, which he was conducting at that time, and he carried on with this until a special gemmology correspondence course was prepared by Mr. I. Jardine. It was at a meeting of the Gemmological Committee of the National Association of Goldsmiths in May, 1931, that approval was given to Mr. Tremayne's proposal for the formation of a Gemmological Association.