THE JOURNAL OF GEMMOLOGY

AND PROCEEDINGS OF THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

Vol. I No. 3 JULY 1947

THERE can be no doubt that the most practical method available to the gemmologist for determining the specific gravity of his specimens is by the use of heavy liquids. For stones of low density the relatively harmless and inexpensive liquids bromoform and acetylene tetrabromide are available, but for values above 2.9 either methylene iodide or Clerici solution (thallium malonate and formate in water) must be employed, and these are both poisonous and expensive. Moreover, even the most concentrated Clerici solution has at room temperatures a density not much higher than 4.2, which provides only a " negative " result for some of the denser gem materials and for the precious metals.

In a short article in the February issue of the " Jeweler's Circular—Keystone," Dr. A. C. Hawkins describes a series of viscous colloidal fluids or " gels " which he has produced to replace the customary heavy liquids. He claims that the new gels are clean, non-poisonous, water-soluble and inexpensive, and that they enable the user to discriminate even between materials of high density such as platinum and other white alloys or between 22 carat and 18 carat gold.

In these ingenious preparations it is the viscosity and not the density of the fluids which keeps stones afloat or regulates their rate of fall. Rate of fall, indeed, is the important factor in using these gels, and must be measured and compared with stones of known density and of similar size to the stones tested—for stones

of larger size sink more rapidly in the viscous medium than smaller specimens of the same density.

Herein seems to lie a weakness in the new method: density values in which the size and shape of the stone must be taken into account are unreliable unless accompanied by comparative tests, and these comparative tests must necessarily take some time, even supposing appropriate specimens for the comparison are readily available.

The reviewer recalls how in 1935 Mr. R. K. Mitchell carried out some experiments at his request in which it was hoped to show that the rate of fall in tall columns of bromoform would serve to distinguish between stones of density considerably higher than that of the liquid. A graduated burette was used to provide the long column needed, in which the time of fall between two agreed points could be accurately measured with a stop-watch. It was found, however, that not only did style of cutting affect the result, but that even with spinel octahedra of identical density and form the larger specimens sank more rapidly than the smaller. The experiments were then (perhaps prematurely) abandoned.

While on the subject, it may be suggested that there is room for experiments on the possibilities of heavy sands in place of liquids, in which heavy gems would sink on shaking while lighter stones remained at the surface. Accurate results could not be expected, but separation, for instance, of cassiterite from zircon, or of zircon from sphene by such a method might well be possible. Heavy zircon and garnet sands are available in nature in large quantity, while modern technology might be capable of providing tiny pellets of glass or of metals covering a wide range of density, which might serve the purpose even better.

To return to Dr. Hawkins' gels: he recommends a set of four, contained in glass tubes, with each of which a wire spoon is provided for the easy removal and draining of specimens tested. The function of each can be briefly stated:

(a) A gel of low viscosity in which opal (2.00) will sink below the surface in about 10 seconds. Even slower rates of fall will be found in amber (1.08) and the various plastics (around 1.3).

(b) In this, opal will float, while quartz (2.65), diamond (3.52) and spinel (3.60) will sink in successively shorter periods of time.

(c) A gel suitable for stones with density 3.00-5.00.

(d) A highly viscous gel suitable for tests on haematite, pyrites, etc.

A paragraph in Dr. Hawkins' paper with which few gemmologists will agree reads as follows: " Synthetic stones may have included bubbles of air or other gas and when such bubbles are present in excessive quantities these stones are definitely lower in density than the genuine. This important difference is usually shown by the slower rate of sinking of the synthetics." Actually, in modern synthetics the proportion of included gas bubbles is exceedingly small and the resultant lowering of density may well be exceeded by the cavities and low-density inclusions found in some natural corundums. In the rare cases where large gas bubbles do exert a significant effect on the density the synthetic would so readily be detected by a glance under the microscope or even with a pocket lens as to render a delicate density test an entire waste of time.

Dr. Hawkins' gels are being marketed in the U.S.A. by Cargille Scientific, Inc., New York—a firm for which Dr. Hawkins is laboratory consultant. It is to be hoped that the fluids will before long be available in this country, for they seem to open up very interesting possibilities.

B. W. ANDERSON, B.Sc., F.G.A.

NEWS FROM AMERICA

The American Gem Society has recommended to its members that the term " semi-precious " be discontinued. The term is said to be meaningless and confusing to the public, as many fine quality so-called " semi-precious " stones are actually more valuable than a precious stone with imperfections and of inferior grade.

Surface Tension and Air Bubbles in Hydrostatic Weighing

by G. M. SPRAGUE

THERE is on the market a " Wetting Solution " which is intended to promote the free flow of liquids and to prevent the formation of air bubbles on photographic plates and films during processing.

It achieves this result by lowering the surface tension of the (aqueous) liquid to which it is added, and it occurred to me that the solution would be of use in carrying out a hydrostatic weighing, both in eliminating air bubbles and in lessening the pull on the wire due to surface tension. The usual method of obtaining these results by the use of toluol instead of water is at best a smelly and somewhat inconvenient business.

The surface tension of water is of the order of 75 dynes per cm. and that of toluol is of the order of 30 dynes per cm. The addition of 20 drops of wetting solution to each fluid ounce of water (or, say, one dessertspoonful to a half pint) reduces the surface tension to about 40 dynes per cm.

This quantity of solution has a negligible effect on the Sp. g. of the water, and it will be found that the degree of accuracy obtainable is as great as is compatible with the fineness of working of the ordinary balance. The main benefit, however, is the ease with which troublesome air bubbles are eliminated, even those which usually lurk in corners under the wire cage and refuse to disappear. If any should be seen when the stone is first immersed, they are easily dislodged by gentle shaking. Temperature corrections may be made, if desired, in the normal way.

The data given above are based on information supplied by the makers, Messrs. Burroughs Wellcome & Co. The solution is obtainable through any photographic dealer.

By ROBERT WEBSTER, F.G.A.

An Interesting ETCHED DIAMOND

SOME notes on a diamond which recently passed through my hands may have an interest for readers of the *Journal of Gemmology*. The stone, having a spread of about 2 carats, was mounted, with diamond baguettes, in a platinum mount as a solitaire ring and had been severely damaged by fire ; a fire which must have been slow and not intense, for the platinum mount had suffered no damage, although the whole surface of the diamond, and the baguettes, had taken on a frosted appearance.

When the stone was examined under the ultra-violet lamp a reddish mauve fluorescence was observed ; a fluorescent hue characteristic of many rough diamonds. Confirmation that the stone was a diamond was made by examination of the absorption spectrum which showed the band at 4155Å recorded by Walter in 1891. However, when the rough, soda-like surface was examined under a low-power microscope a most beautiful pattern of triangular depressions, reminiscent of the " trigons " so often seen on the octahedral faces of natural diamond crystals, was observed.

The etch marking by fire of a diamond surface is no new thing, but problems arising from these natural and artificial cavities have intrigued scientists the world over. Sir William Crookes[1] mentions Gustav Rose[2] as having pointed out that triangular striations appear on the surface of diamonds burnt before the blowpipe, and from resemblance to the " trigons " on natural diamond faces Rose assumed the probability that natural diamonds had at some previous time been exposed to incipient combustion.

Crookes repeated this burning experiment on a clean diamond and obtained this triangular pitting, but pronounced that in his opinion the pits had a different character to the " trigons " on the natural crystal faces.

A vast amount of work and consideration of the subject of etch and growth cavities has been carried out by Fersmann and Goldschmidt[3] ; by Friedel[4] and Sir Robert Robertson[5] amongst many others. J. Parry at the De Beers Laboratory made an examination of artificially formed etch markings on diamond by using a fusion of potassium nitrate (saltpetre = KNO_3) at 900° C. ; the result of immersing a diamond in such a fusion mixture is that oxidation of carbon takes place and the diamond therefore dissolves. (References and comments on the action of heat and chemicals on diamond are given by Grodzinski[6].) A. F. Williams, in his work *The Genesis of the Diamond*[7] has correlated all the previous work (1932) and has added information and deductions from his own experiments.

Fig. 1 — Magnification 380x

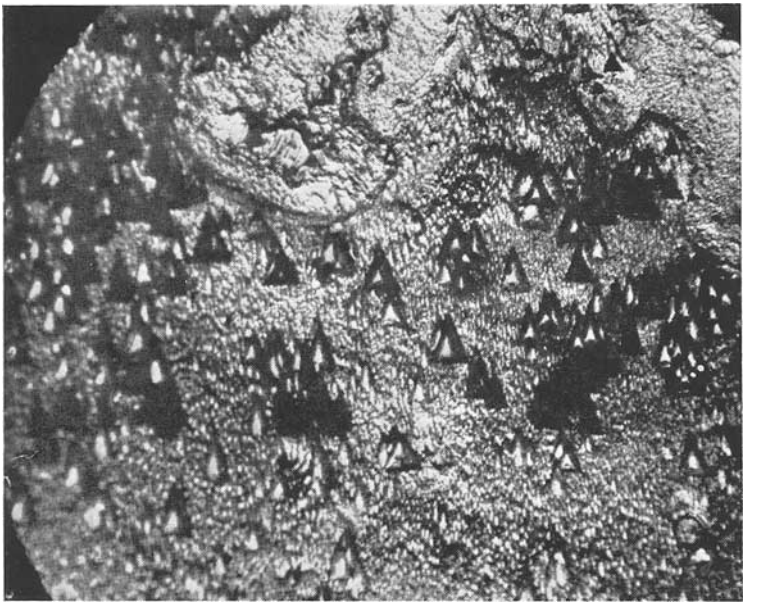


Fig. 2 – Magnification 38x

It has been pointed out by Sutton[8] and other workers that the corners of the " trigons " on an octahedral face of a diamond crystal point towards the edge of the octahedron face, while the triangular cavities etched by solution (or fire) are conformable to the face of the octahedron (that this is always so has been disputed. *Editorial note to Kayser*[12]). The argument whether the " trigons " on natural faces are due to etching or to growth, a debate which has been going on for some fifty years, has not yet been clearly decided. Briefly, Rose[2], Fersmann and Goldschmidt[3] and Miers[9] favour the etch theory, while Crookes[1], Sutton[8], Honess[10], Van der Veen[11], Williams[7] and Friedel[4] take the view that these pits are due to growth.

Quite recently the new technique of interferometry has been applied to the problem of these triangular pits, Kayser[12] using the two-beam method and Tolansky and Wilcock[13] the multiple-beam method. The latter workers suggest that they have at last proved that the depressions are due to growth.

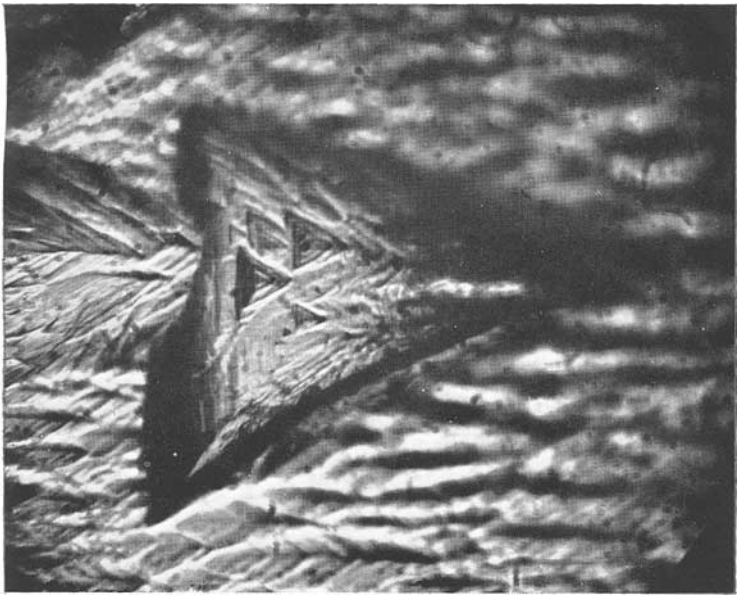


Fig. 3 — Magnification 380x

In this short resumé I hope to have told something about an interesting stone ; something, too, about the work which goes on in scientific circles in the attempt to unravel the mystery of the genesis of the diamond. Small as they are, these depressions can have an absorbing interest, and for that very reason I have attempted to give as full a list as possible of the references to literature. The written word alone could scarce convey the beauty of the marks on the damaged diamond, but fine photography can ; therefore, I conclude in offering thanks to Dr. W. Stern, of Industrial Distributors (1946), Ltd. (Diamond Research Department), who kindly took the photomicrographs.

REFERENCES

[1] Crookes (W.), *Diamonds*. London and New York. 1909, pp. 87-88. *Diamonds*. Nature. August 5th. 1897.

[2] Rose (G), *Monthly report of the Berlin Academy* 1872. Rose (G), Sadebeck (A), *Ueber die Krystallisation des diamanten*. Berlin. 1876.

[3] Fersmann (A. von) ; Goldschmidt (V.), *Der Diamant.* Heidelberg. 1911.

[4] Friedel (G.), *Observations sur la symétrie et sur les formes du diamant.* 1924.

[5] Robertson (Sir R.) ; Fox (J. J.) ; Martin (A. E.), *Two types of Diamond.* Phil. Trans. Roy. Soc., London. A. vol. 232. 1934, pp. 463-535. *Further work on two types of diamond.* Pros. Roy. Soc. A. vol. 157. 1936, pp. 579-593.

[6] Grodzinski (P.), *Diamond Tools.* London and New York. 1944, pp. 29-35.

[7] Williams (A. F.), *The Genesis of the Diamond.* London. 1932, vol. 2. Chap. XVII, pp. 481-515.

[8] Sutton (J. R.), *Diamond, a descriptive treatise.* London. 1928, pp. 25-27, 78-86.

[9] Miers (H. A.), *Diamond.* Encl. Brit. 11th Edn. *Mineralogy,* 1902.

[10] Honess (A. P.), *The nature, origin and interpretation of the etch figures on crystals.*

[11] Van der Veen (A. L. W. E.), *Die symmetrie der Diamanten.* 1913.

[12] Kayser (J. F.), *The micro topography of the facets of industrial diamonds.* Industrial Diamond Review. January, 1944, 4, pp. 2-3.

[13] Tolansky (S.) ; Wilcock (W. L.), *Topography of the face of a diamond crystal.* Nature. May 4th, 1946, vol. 157, pp. 583.

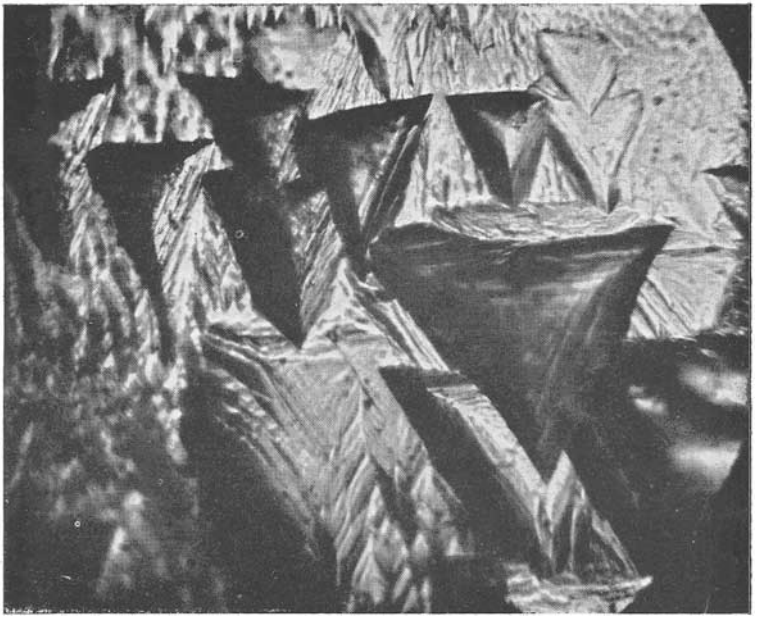


Fig. 4 — Magnification 380x

NOTES BY D. S. M. FIELD ON THE

Crystallinity of OPAL

ALTHOUGH opals are widely believed to be truly non-crystalline gemstones resulting from the solidification of an amorphous silica gel, laboratory experiments have shown that in both the precious and common varieties the atomic arrangement is not entirely random.

Dwyer and Mellor in Australia, and Levin and Ott in the United States—among others—point out that most opals give definite X-ray diffraction patterns which are identical with that of β— cristobalite ; whilst in a number of instances only a broad diffuse band characteristic of amorphous substance is obtainable.

It has been shown, however *(v. Randall, Rooksby, and Cooper, "Zeitshrift für Kristallographie"* LXXV, 201, 1930) that vitreous and precipitated "amorphous" silica produces a broad band and it is in the position of the most intense line of the diffraction pattern of either α or β— cristobalite. These scientists believe that the band is due to the presence of β— cristobalite crystallites with diameters ranging from 10^{-6} to 10^{-7} cm. It is therefore suggested that the broad band of apparently non-crystalline opals is due not to irregularity in the atomic structure but to the presence of an infinite number of crystallites of cristobalite of colloidal dimensions.

Kreji and Ott *("Jour. Phys. Chem.," XXXV, No. 7, 1931)* found that freshly prepared silica gel shows distinctly the presence of ultra-microscopic crystallites of the aforementioned mineral. This would appear to indicate that the tendency towards a regular arrangement of the atoms of the opal takes place during the formation of the gel.

Thermal study of cristobalite shows that the inversion point of α— cristobalite to the β— form lies between 198° and 275° Centigrade (Dana—Ford). We may assume, therefore, that all opals giving the diffraction pattern of β — cristobalite have been heated in nature above the temperature at which the inversion takes place. This assumption is borne out by the fact that opals which have been formed in association with volcanic rocks, for example, opals from Quéretaro, Tintenbar, and Ballina, etc., all show sharp β— cristobalite diffraction patterns, whilst those found associated with sedimentary shales and limestones (Lightning Ridge, White Cliffs, Coberpedy, etc.) do not. *(Dwyer and Mellor.)*

Further proof of the crystallinity of opal is given by Talliaferro *("Amer. Jour. Science," November, 1935)*. Experiments carried out by Dr. Talliaferro have indicated that the values of the refractive index and specific gravity, when plotted against water content, lie between the curves of the systems amorphous silica-water and cristobalite-water. He states:

> " The departure of both index and density from the theoretical silica-water curve is due to the tendency toward atomic arrangement in the direction of the β— cristobalite modification."

He further states that no traces of actual cristobalite crystals or of any crystalline material were found in the opals examined. Their presence has been noted, however, in a few instances by other authorities *(v. Sosman, " Jour. Amer. Chem. Soc.," LIX, 3015, 1932; Grieg, Ibid LXXVI, 300)*.

It is interesting to note that loss of colour-play seems to occur only in opals which have been formed at high temperature. This would seem to indicate that the colour play depends to some extent upon the presence of cristobalite in the β form.

Dwyer and Mellor found that " β— cristobalite prepared (in the laboratory) from opals by fluxing at 800° C. persisted up to six months, while specimens prepared from the same opals at 1,500° C. inverted promptly on cooling. In all cases the persistence became more marked as the temperature of fluxing was

lowered. It is considered, therefore, quite possible that the cristobalite produced at the relatively low temperatures of magmatic waters, often as low as 200° C., should show great stability." *(Proc. Roy. Soc., N.S.W., 1934).*

Another point of interest to gemmologists is that certain specimens of precious opal were heated for six to eight hours at approximately 1,000° C., yet lost none of their play of colour. The specimens came from Tintenbar and Coberpedy *(Proc. Roy. Soc., N.S.W., 1932).*

Baier *(Fortschritte der Mineralogie, Kristallographie und Petrographie, XV, 1931, and Zeitschrift für Kristallographie, LXXXI, 1932)* attributes the iridescence of precious opal to pseudomorphosis after rhombohedra of calcite, the lamellar twinning structure of which has been preserved in the opal as thin films which produce optical interference. The excellent photomicrographs which accompany his second paper show clearly the presence of a crystalline structure or pseudomorphous crystallinity.

Summary.

(a) A crystalline or pseudo-crystalline structure—most probably that of α— cristobalite—is possessed by the silica gel from which opals are presumably formed.

(b) An inversion of the α— cristobalite to the β form has occurred either during the formation of the gel or subsequent to its deposition in all cases where opals have been subjected to the thermal action of magmatic waters during lava flows.

(c) The atomic arrangement has sufficient regularity to give in many cases definite β— cristobalite X-ray diffraction patterns, and to cause the departure of both R.I. and S.G. from the theoretical amorphous silica-water curves.

(d) Loss of colour play occurs only in opals which have been subjected to high temperatures during formation of the gel.

With the exception of brief mention of Baier's hypothesis by Smith (*Gemstones*) and Webster (*Practical Gemmology* and *Introductory Gemmology*), I have not found any reference to the crystallinity or pseudo-crystalline structure of opal in gemmological literature

Experimental
Photomicrography • Photospectrography • Interference Figure Photography

By JOHN VINCENT, F.G.A.

AS a prelude to these notes which give an account of certain experimental work carried out in the Laboratory attached to Messrs. John Vincent, Ltd., of Weymouth, it must be stressed that the writer is fully cognisant of the fact that many would-be practical gemmologists have neither the facilities nor the encouragement to develop their knowledge to the commercial benefit of their various firms. It is a sad fact that the science of gemmology is still regarded as " Black Magic " by many Captains of Industry in the jewellery trade and consequently any suggestion regarding the allocation of window space for special displays of gemstones or small grants for the purpose of purchasing gemmological instruments are dismissed as being " non-commercial " and " totally unnecessary." The writer of this article has had plenty of first-hand experience of this attitude and would point out that such a short-sighted policy must inevitably retard that enlightened day when every retail jeweller of standing will be possessed of the necessary knowledge and equipment appertaining to the buying and selling of precious stones, thus raising the trade to new high levels and automatically increasing the confidence of his customers.

Knowing full well that the average keen practical gemmologist has not great finances at his disposal, and that, in any case, grants allowed for the purchase of equipment would probably be small, the laboratory has conducted a series of experiments with the object of finding out just what can be done and how far one can go by using the least expensive and minimum amount of apparatus. Most of the instruments used have been bought second-hand ; difficulties both large and small have arisen from time to

time, but improvisation combined with a lot of faith and blind hope have overcome most of them. Welcome encouragement has attended some of the experimental work in the form of acceptance by the Gemmological Association of some photomicrographs of the internal structures of gemstones for the recent exhibition held at the Goldsmiths' Hall early this year and publicity gained through favourable write-ups in the newspapers of gem displays featured in past months. It is not proposed to describe the inauguration of the gem laboratory, as this has been done in a previous article ; it is enough to say that so far it has been an unqualified success and is a substantial handle for argument with the " steel file-cum-guesswork " jewellers and their ilk.

The two main themes for experiment were photomicrography and photospectrography, using black and white and colour film. Interference figure photography of cut gemstones in convergent monochromatic polarized light was also attempted and results of a sort were obtained. The apparatus used throughout these experiments consisted of a microscope (1880 vintage), a second-hand Brownie box camera and a Beck pocket spectroscope, including various complementary home-made equipment. These experiments will now be discussed separately.

PHOTOMICROGRAPHY

The microscope used for this work was located in an attic where it had lain for a considerable time. After the instrument had been thoroughly cleaned and made ready for use, it was found that the stage consisted of a platform with a circular hole in the centre and was minus condenser and reflecting mirror. Three screw-on objectives accompanies the microscope, $\frac{1}{2}$ in. (cracked), 1 in. and 2 in. The camera which it was proposed to use in conjunction with the microscope was in an extremely poor condition, having an ill-fitting body, cracks in the woodwork and a jammed shutter. The setting up of the apparatus was as follows:

A concave metal shaving mirror was utilised for the purpose of reflecting light through the central aperture of the stage and into the body of the microscope. To regulate the strength of light, a circular disc of black cardboard was cut about four inches in diameter in which was pierced a series of holes of varying size.

PROTOTYPE MICROGRAPHS TAKEN IN THE LABORATORY

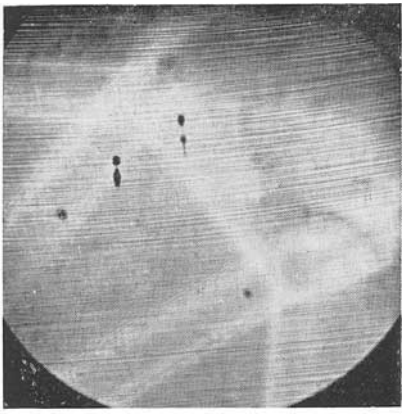


Fig. 1 — Synthetic Ruby. One inch objective. Panchromatic roll film. 150 watt pearl. 12 secs. exposure.

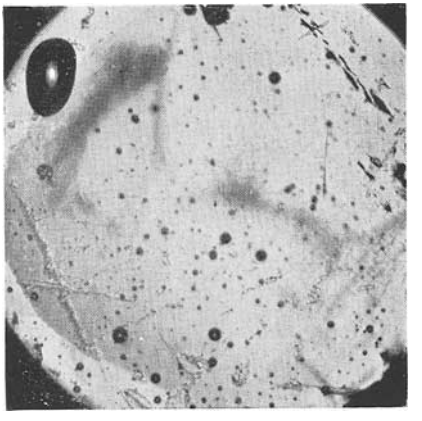


Fig. 2 — Silk and Bubble layer in Almandine Topped Doublet Panchromatic roll film. 150 watt pearl. 6 secs. exposure.

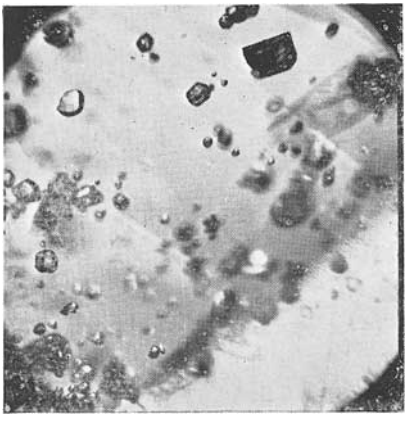


Fig. 3 — Inclusions in Ceylon Sapphires. 500 watt Nitrophot flood. ½ inch objective. 10 secs. exposure. Pan. roll film.

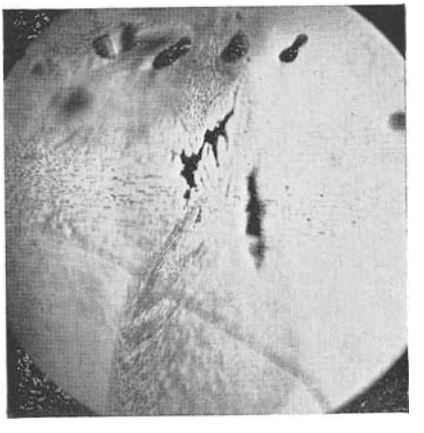


Fig. 4 — Inclusions in Ceylon Sapphires. 500 watt Nitrophot flood. ½ inch objective. 10 secs. exposure. Pan. roll film.

This was then attached underneath the stage in such a way that the disc could be rotated, thus bringing the holes into line with the aperture. A glass slide was then laid across the stage, and this in turn supported a glass inkwell filled with highly refracting fluid. With a stone immersed in the liquid, the microscope objective was focussed in the normal way, correct lighting being obtained by rotating the disc at the bottom of the stage.

Having rendered the camera lightproof by sticking insulating tape over the cracks in the body and repairing the shutter, the back of the camera was then prised off and a ground glass screen laid across the instrument. It was found that when the camera was superimposed over the microscope eyepiece, a small, ill-defined image appeared on the improvised screen. By inserting a cardboard tube of certain length containing a series of supplementary spectacle lenses as between camera and microscope, it was seen that " infinity " had been produced and that a clear image formed itself on the screen. In order to combine the largest possible image with the minimum wastage of film, the distance between the lens had to be varied until an image was obtained of such a size as to let its outer arcs be tangential to the bounding edges of the proposed film. This latter was only attained after great difficulty, but once the correct distance was obtained, it was found that the resultant focus was constant for the particular objective used for the experiments, irrespective of the movement of the objective towards its own point of focus.

The back of the camera was then nailed down and the camera loaded. Laboratory retort stands were used to support the camera over the lens tube and microscope, and exposures effected in the normal manner. The advantage of using roll film was obvious. Exposures could be made in sequence by merely winding the film on without disturbing the apparatus in any way supposing different exposures of the same specimen were required ; eight pictures could be taken on a standard film roll. Standard panchromatic super double X film was used in these experiments, exposure times varied from 2 seconds to 3 minutes and light source varied from 150 watt pearl gas-filled bulbs to 800 watt Nitrophot flood laps for very dark stones. Once the apparatus was set up, ex-

posures could be made at the rate of 15 minutes per film roll supposing eight different specimens were photographed in sequence.

Most of the stones for test were mounted as rings and the best way of dealing with these was to suspend the ring stone uppermost in the liquid by hooking a bent metal hairpin through either side of the ring shank and bending the ends over the lip of the container. The objective could then be racked down on to the stone without fear of damaging the objective itself. Examples of prototype micrographs accompany this article.

SPECTROGRAPHY

Obtaining results in spectrography using the limited apparatus available proved to be rather more difficult than was at first anticipated. The instruments employed in this work were the microscope as previously described, the Brownie Box camera and a Beck pocket spectroscope. In the absence of a condenser, a twenty dioptre spectacle lens held in a clamp served the purpose, and light was passed by a concave metal shaving mirror as in the micrograph experiments. A hole was drilled in the stage of the microscope and a peg inserted which held a metal collar. This in turn held a six-inch brass rod with a dop cup at one end and a spring clip at the other. The clip held a ring by the shank for examination and the dop cup held a lump of wax in which an unmounted gem could be set for test. The rod enabled either the ring or stone to be positioned in the central aperture of the stage, it could be moved up and down the collar and was also rotatable about its longitudinal axis, thus facilitating transmitted light from the stone under test to be passed through into the body of the microscope tube.

It was found that the best results were obtained by using a $\frac{1}{2}$ inch objective for stones with small facets and a 1 inch for cabochon and larger specimens. The pocket spectroscope was screwed on to a ball and socket head with tripod attached, and by this means the instrument could be clamped in any position over the microscope tube. When the camera was placed over the spectroscope, the same difficulty occurred in the correct spacing of the spectacle lens in the auxiliary tube in order to obtain the

correct focus. When the focus had been attained and a trial " take " had been effected, it was seen that the resultant spectrograph negatives showed a cut off at either end of the spectrum at 6,500Å and 4,300Å respectively. In an attempt to overcome this new snag, the eyepiece of the spectroscope was unscrewed and the tube containing the lens series was brought down and almost into contact with the prism. A cardboard collar was placed around the junction of the spectroscope tube and lens tube to exclude extraneous light and a further sequence of exposures made. The cut-off remained as before and, in addition, a flooding of the red end of the spectrum spoilt the negatives. In either case, with or without the spectroscope eyepiece, the over-exposure was always present. To try to combat this difficulty half filters were placed between spectroscope and camera with the object of slowing down and holding back the red portion of the visible spectrum, while giving the violet end a chance to register on the film. This latter proved to be another failure and during six months of experimenting with various ideas no real headway was made in eliminating the cut off and flooding. By altering the lighting, better results were obtained but there was room for considerable improvement. It is only during the last few days that real progress has been achieved by using a different technique, which will be the subject of a further article in the future.

Light source for these experiments varied from 150 watt pearl bulbs to 1,600 watt double Nitrophot flood lamps. Exposure times also varied from 2 seconds to 100 seconds. Panchromatic super double X film was found to be the most successful for this type of work, being sensitive to the whole visible spectrum range. Work carried out with Dufay colour film was spasmodic, due to the acute shortage of colour film, which was even more difficult to obtain than pan. film. The Dufay colour transparencies do not show the true colours of the spectrum, a fact concerning which the makers are at pains to inform would-be users of this particular type of film. Results therefore did not cause such misgivings as would have been felt otherwise. The exposure factor in the colour photography was 4x approximately. It was found that accuracy in exposure times was infinitely more essential than when exposures were being made with panchromatic film. The time lag for colour film was only a second each way compared with the ten

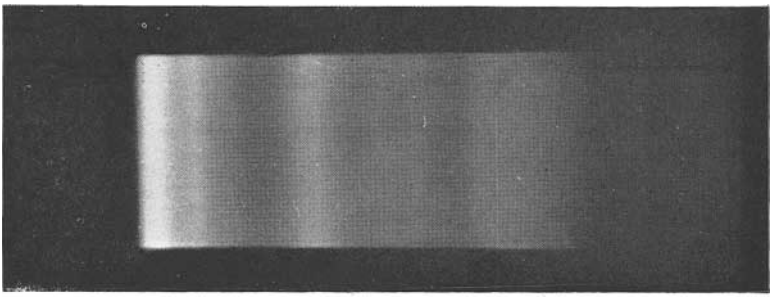


Fig. 5 *Spectrum of Natural Blue Spinel. 1600 watt Double Nitrophot flood. ½ inch objective. Pan roll film. 75 secs. exposure.*

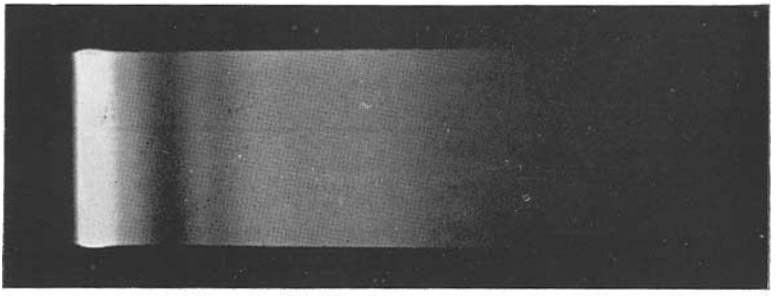


Fig. 6 — Spectrum of Synthethic Blue Spinel. 800 watt Nitrophot flood. ½ inch objective. Pan. roll film. 68 secs. exposure.

seconds lag for the panchromatic film. At present Dufay film is the only colour film obtainable in England and is not recommended by the writer for this work. The ideal colour film is the new American Kodachrome, which is not on sale in this country as yet.

By suitably masking the back of the camera, it was found that twenty-five exposures could be made on a standard roll film. Thus the cost of producing the spectrographs was considerably less than the micrographs and would have been less still but for the short life of the Nitrophot lamps, which averaged about half an hour's burning time. Further improvements in the cost of production enabled a photomicrograph and photospectrograph of the

customer's gemstone to be included in a special laboratory folder together with the routine certificate of testing. A charge of five shillings was made for the folder complete with certificate and two photographs, and many clients availed themselves of this innovation.

The micrograph serves as a fingerprint photograph of the gemstone and is useful in the case of loss or theft as identification by comparison is the work of a moment, no two gems having identically placed inclusions. The spectrograph, while not essential, is tangible evidence of scientific examination and cannot fail to give a favourable impression and a sense of confidence.

The laboratory aims at a forty-eight hour service for clients, but developing and printing difficulties and shortage of photographic materials render preparation of the complete folder impossible in under seven days at present. It is hoped to remove production bottlenecks in the near future.

INTERFERENCE FIGURE PHOTOGRAPHY

Besides the routine testing and preparation of photographs in conjunction with certificates issued, recent work has been concentrated on photographing interference figures of cut gemstones in convergent monochromatic polarized light, for the purpose of incorporating the finished pictures in a series of new gem displays, now a permanent feature of the firm. A brief note on the setting up of the apparatus and difficulties encountered during these experiments may be of interest to readers.

Two series of condensing lenses were purchased for a few shillings and these were mounted in a cardboard roll and cemented in position, thus making a home-made double-bank condenser. The polarizer from the microscope was then taped to the bottom of the condenser series by insulating adhesive and the whole contraption supported under the stage by means of a laboratory retort stand. Two spectacle lenses were then fixed together and lodged half-way down the body of the microscope tube, thus acting as a Bertrand lens. By this means the interference figure could be viewed without having to remove the eyepiece of the microscope and also gave a larger image. The camera and lens tube were

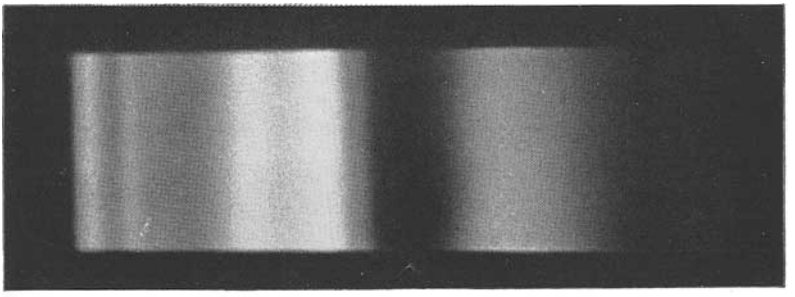


Fig. 7 — Spectrum of Natural Blue Australian Sapphire. 800 watt Nitrophot flood. 1 inch objective. Pan. roll film. 45 secs. exposure.

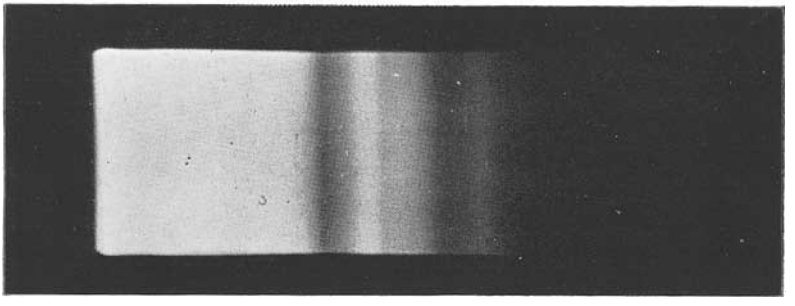


Fig. 8 —Spectrum of Peridot. 1600 watt double Nitrophot flood. 1 inch objective. Pan. roll film. 25 secs. exposure.

rigged up over the microscope and an Ilford Spectrum Yellow filter was inserted between eyepiece and tube to give a sodium light effect, thereby making the concentric rings which appeared coloured in white light, black and well defined. The focussing difficulty proved to be even more of a headache than was previously experienced in other instances and several rolls of precious film were wasted before printable negatives were secured. Difficulty with lighting and positioning of the stone was also experienced, and it was found that to get anything worth the trouble of photographing, many minutes had to be spent in getting the scene " just right " for the final " take." As no thin plates of material were available, perfect figures were unobtainable, but pictures of cut and facetted stones from the firm's collection were taken in the

laboratory, and although much remains to be done in this direction, a start has been made and this particular work has been found to be an all-absorbing study, mainly on account of the difficulties encountered.

In concluding these notes it may be worth mentioning that since the inauguration of the laboratory there have been many instances where its foundation has been fully justified. A few incidents from the laboratory Case Book may now be quoted. These happenings are perfectly true and may be vouched for ; each case has occurred within the last six months.

Case No. 1 is that *rara avis*, the case of the dealer who sold a real stone for a synthetic. A stone was recently shown by a dealer who described it as a " Synthetic fancy Sapphire " ; the specimen proved to be an "Almandine " Spinel of over 40 carats. Advantage was taken of the dealer in this instance as it was considered that a man should know his stock ; also, there were, and are, facilities for gaining knowledge regarding precious stones which are open to all members of the trade. If a man is either too lazy to avail himself of the opportunities afforded him by the trade educational organization or thinks that " He Knows It All," then he should take the consequences. The next case was that of a traveller belonging to a well-known firm offering for sale, in all good faith, a canary yellow diamond of over a carat in weight. As a result of a routine check, it was found that the diamond was a yellow sapphire and the traveller was recommended to send the ring to the Hatton Garden Laboratory for test. A letter was later sent from the firm in question apologizing for their mistake and offering the yellow sapphire ring for sale at a fraction of the original price asked.

The third case was of an old and valued client whose family had been customers for many years. Interested in the new gem displays and the laboratory photographs, she proffered a pretty green stone set in an antique ring for examination and test. The pretty green stone turned out to be an almost flawless Colombian Emerald and an approximate value of two thousand pounds was placed on it. This ring was subsequently sold for this figure in a London sale room, an account of which appeared in " The

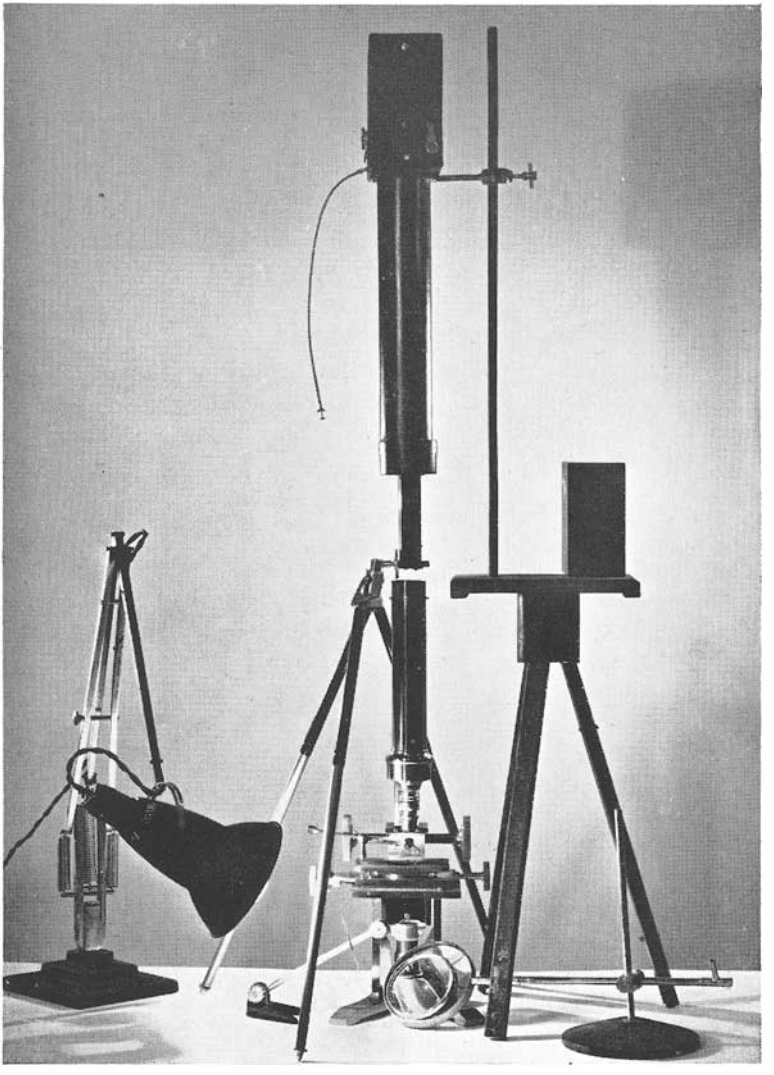


Fig. 9 — Prototype apparatus for photographing absorption spectra of gemstones, using roll film, Brownie camera, spectroscope and microscope.

Times " recently. The benefit to the firm from this incident was considerable. The customer, moving in highly influential circles, did not keep her good fortune to herself.

The last case is a bad one and, unfortunately, is not isolated. A self-styled " Dealer " offered a twelve carat Alexandrite for sale at £86. On being informed that the Alexandrite was a vanadium-tinted synthetic corundum, he did not seem in the least surprised and gave the impression that he had failed to " put it over." Such behaviour does incalculable harm to the trade in general, as the base creature would hawk the ring until he found some avaricious half-wit who traded under the name of " Jeweller," who would throw the small amount of discretion he might possess to the four winds (a twelve carat Alexandrite for £86!), and pay out the money for a comparatively worthless article. The public would suffer in the end, of course, but then so would the trade when the unfortunate purchaser's confidence in the jewellery trade had been blasted for ever. As has been said, all these cases happened to one provincial firm in this country in six months. Multiply these few instances by many thousand, and it appears obvious that much remains to be done in the way of educating everyone up to higher standards in the gemmological world.

Thus the work of a provincial gem laboratory progresses and continues to safeguard the interests of employers and clients alike. If this account of work which has been done and is being done in this laboratory has fired any embryo gemmologists with the necessary enthusiasm to branch out along similar lines, then the time taken in the compilation of these notes will not have been wasted.

By DAN E. MAYERS, Mining Geologist

The Gems of MEXICO

FOR a country so abundantly blessed with natural resources, Mexico is rather deficient in gems. This is due largely to the thick beds of Cretaceous limestone which blanket much of the region ; fabulously rich replacement deposits of lead and silver are found in this limestone, but gem-bearing pegmatite veins, so characteristic of Brazil and Madagascar, are absent. The pattern of Mexico's mineral wealth is particularly well demonstrated in her jewellery, emphasizing rich and massive designs of silver and gold with stones used merely to highlight the silversmith's skill.

This article touches only upon gems of commercial importance ; the subject of Mexican Jade (the genuine kind rather than the currently-plentiful analine-dyed limestone) is chiefly of archaeological interest.

OPAL

Precious opal from the State of Queretaro (kay-ray-ta-ro) is a truly outstanding stone, when of fine quality, but mining and distribution, carried out in the haphazard manner typical of Latin America, have combined to give the stone a poor name. Particularly notable are the Mexican opals contained in the display of the Smithsonian Institute ; these stones have magnificent fire, equalling the finest white opals of Australia and Hungary. Mexican opal appears to glow with a sort of internal warmth and pulsating colour reminding one of an enormous rainbow-hued pearl ; it lacks the harshness of colour characteristic of Australian and Nevadan stones.

Opals are widely distributed throughout the State of Queretaro and adjoining regions, occurring in small nodules and veins in brown to white trachytic porphyry, the opal usually coinciding in colour with the porphyry. Opaque white opal resembling the Australian, but of inferior fire, is found occasionally in masses of considerable size.[1]

Though Queretaro opal is plentiful, few mines produce genuinely fine durable stones. Opals from most of these localities, though pretty at first, have a strong tendency to crack on ageing. This has been well advertised by the lapidaries of Queretaro City (the State's capital), who usually keep a liberal supply of these stones in oil for sale to tourists. Due largely to this far-sighted business practice Mexican opal labours under a reputation for cheapness and brittleness ; nevertheless, discriminating opal connoisseurs appreciate its true worth.

At present the Carbonero Mine, located north-east of San Juan del Rio, near Tequisquiapan (tay-keys-kee-yáp-pan) is the chief source of good stones. The mine is just now in an ugly state of disrepair as the result of a five-year suit over its ownership. The dispute was recently settled and it seems likely that the mine may resume production shortly. More opal would be recovered in usable form if dynamite were used less prodigally.

The price of Queretaro opal varies enormously. Small stones showing little fire bring from 5c. to 50c. each. Truly fine stones are very rare and bring as much as $7.50 per carat in Queretaro.

It is to be hoped that the gem trade will eventually appreciate good Mexican opals, for they are fine stones and deserve a higher regard than they now enjoy.

AMETHYST

Little or no flawless Amethyst occurs in Mexico. However, in the mountains near Taxco (Tass-go)—a town once famous for its silver mines and now noted for the picturesqueness of its streets and the artistry of its silversmiths—are numerous veins which yield Amethyst of fair to excellent colour, though almost opaque from numerous flaws. Individual crystals are several inches long and up to an inch in diameter ; due to intense intergrowth, cementation, and flaws they do not possess the beauty of comparable specimens from Brazil or Uruguay. Only rarely is a portion of a crystal sufficiently clear to allow the cutting of a flawless stone of more than a few carats' weight.

These crystals are shipped from Taxco to Queretaro City, the lapidary centre of the nation. Here the amethyst is cut and polished ; most is cut en cabochon, but some of the better material is carved into rudimentary figures—miniature frogs, for example

—suitable for a better grade of silver jewellery. Most of the cut stones eventually find their way back to Taxco, where they are mounted.

Amethyst also occurs in Guanajuato (wann-a-watt-to) in some quantity ; although more pleasing as mineral specimens than is the Taxco material, Guanajuato amethysts are vastly inferior in size, colour and transparency.

The author received, on one occasion, some small, flawless, pale doubly-terminated amethyst crystals from an unknown locality in Sonora ; they greatly resembled Herkimer quartz in appearance. No more is known of this occurrence.

OTHER STONES

Turquoise occurs in several places in Mexico: Northern Chihuahua ; Concepcion del Oro, Zacatecas ; Lower California. These deposits have been worked sporadically for the past fifty years with decreasing success. Turquoise produced tends to be greenish, light in colour, small in size, and rather soft.

A flawless one-carat emerald crystal was recently shown the author by a fairly reliable miner. The miner claimed to have discovered it in the State of Oaxaca (wa-ha-ka) in a region noted for its unfriendly Indians.[2]

During the war a flourishing business in Queretaro City was based on the manufacture of coloured glass in imitation of precious stones. Magnificent large " aquamarines," " amethysts," " topazes " and " emeralds " made their appearance, not inexpertly cut on home-made faceting machines (jam-peg cutting is unknown in Mexico). The glass stones had unpolished girdles, as the average Mexican thinks this the sign of a genuine stone. Rings mounted with these well-authenticated stones were sold widely and some even found their way into the United States. The merchants who supplied the coloured glass in sheets received amazing prices for " gem rough " of a particularly choice shade.

[1] This opal is frequently converted into a " black " opal of improved fire by raising the stone to a high temperature in the presence of organic material, causing the deposition of carbon in its pores. Such a stone, unfortunately, loses its colour on repolishing.

[2] Many foreigners do not appreciate that access to certain parts of Mexico is not feasible owing to the presence of actively hostile Indians.

KAURI GUM

By ELSIE RUFF, F.G.A.

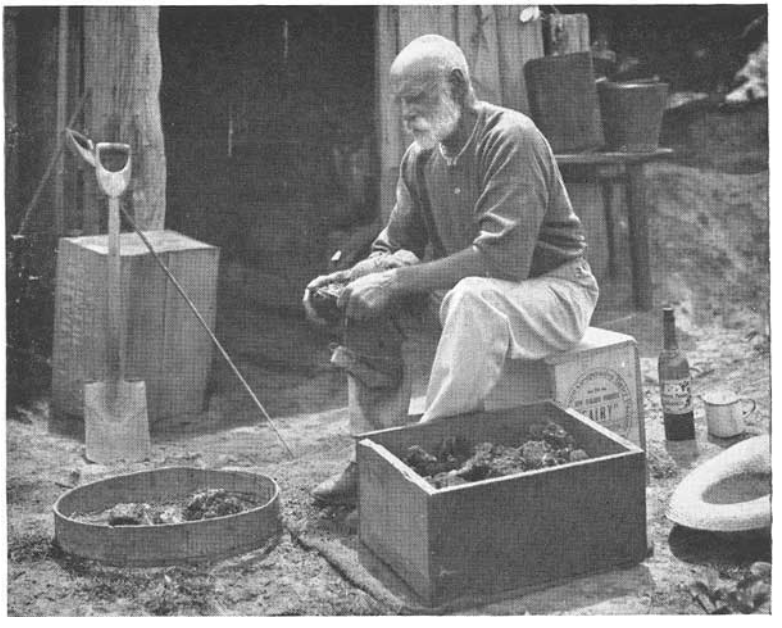
ABOUT one hundred years ago white men were invading a sub-tropical forest that was part of the extreme north of New Zealand's North Island. In so doing they were almost certainly re-living a scene of bygone ages. But this was a kauri forest, and the kauri gum or kauri pine (*agathis australis*) is a columnar, resiniferous tree ranging from 80 to 150 feet in height, its trunk anywhere from 4 to 24 feet in diameter, and with a round bushy head. These grey giants, rising out of a thick undergrowth alive with insect life, sheltered a remarkable range of birds. And over all was a sub-tropical sun and the hush of nature alone, in command. It could hardly have differed from the amber forests of, say, a million or more years ago. And the gum for which men dig (gum-diggers the men are actually called) is largely a fossil variety from the sites of previous forests. (New resin that may be picked from the trunks of living trees as a result of some perhaps slight abrasion is relatively of little value and the process of tapping the tree for this purpose has long been abandoned.) The age of previous forests may be gauged by the fact that present trees running to 24 feet in girth are already over 4,000 years old.

Like everything else, gum that once oozed from the kauri pine is in a process of change—of becoming—and given another million years, which it will not now have, New Zealand might have exported amber in place of the £20 million worth of resinous substance that has proved so satisfactory for varnish, for shellac, and in the manufacture of linoleum.

In recent years the New Zealand Government has exercised some control over the marketing of kauri gum and the wages of the diggers, but up to that time the industry had little or no organization. It was perhaps analogous to opal mining in Australia. The life was an arduous one, particularly because it was an isolated life, and small settlements grew and flourished and died

rather as they did in gold-mining areas. (During 1913 as many as 7,000 diggers were engaged in this work, among them Maoris, Croats and Dalmatians.) Some of the home-made contraptions used for recovering the gum from the soil have been classified *Heath Robinson.*

But gum digging has changed. Formerly only large pieces were retained, often as large as a man's head. Since then ground has been worked a second and a third time. To-day, small chips and even dust are considered profitable. For not only is the gum being worked out, the kauri forest itself is disappearing. Early destruction and accidental fires and the present encroachment of civilization is merely repeating another old story. And the death knell of kauri gum was sounded when a synthetic product appeared on the market, a product adequate because of " its purity, dependable quality, certainty of supply, lower productive cost, and proved suitability. . . ." A recent Government report sums up the situation: " The Kauri Gum Industry is . . . deteriorat-



An old gum digger of Hohoura, North Auckland, North Island, New Zealand (with acknowledgements to the High Commissioner for New Zealand)

ing as the gum bearing areas are being rapidly worked out. The principal method of gum extraction now in use is by washing the gum soil through a series of sieves in a type of machine constructed for the purpose. This enables even the fine particles of gum to be recovered. . . . There are still recoveries of larger gum, but only in small quantities and in isolated localities. . . . It is expected . . . that with the increasing use of synthetic substitutes the overseas demand will fall and prices will not be maintained. . . ."

The possibility of using kauri gum as jewellery has not been overlooked and many a gemmologist must have been confused by this amber-like substance that also closely resembles the copal gum of Africa. (Captain Cook, who seems to have missed nothing, referred to kauri gum in his Journal of 1769.) Several small attempts have in fact been made to launch the material as New Zealand amber, but always its softness, even compared with amber, has baulked such a venture. Pendant pieces are nevertheless sold to the tourist. A substance easily scratched with the finger nail (amber varies from $2\frac{1}{2}$ to 3 on Mohs' scale) is at too great a disadvantage. But resemblances to amber do at times call for a considered decision. In colour the gum ranges from colourless (and translucent) to yellow and a pale and sometimes deep sherry tint. Its specific gravity is around 1.05 and therefore not discriminative, though Herbert P. Whitlock (*The Story of the Gems*) states that by dissolving common salt in water kauri and copal gum will float while true amber will sink, and that this is " a simple and reliable test to distinguish old fossil amber from a more recent gum." Moreover, he writes that " In addition to the gravity test in brine . . . Kauri gum is distinguishable by being more soluble in alcohol than is true amber. A drop of alcohol will cause a certain stickiness to develop on the surface of kauri gum, whereas several moments are required for a similar effect to appear on the surface of an amber piece." Mr. B. W. Anderson (*Gem Testing*) gives as distinguishing features of kauri or copal gum compared with amber, " . . . its readier fusibility when a hot needle is placed on some inconspicuous part of the specimen . . . and by its greater solubility in ether. When a drop of this liquid is placed on copal resin it becomes quite sticky, and a dull spot is left on the surface when the liquid has evapo-

rated." In R.I. kauri gum actually covers amber—my own readings varied from 1.52 to 1.54. Like amber, too, it is warm to the touch and easily electrified by friction. But according to another authority[1] kauri gum has no trace of amber's characteristic succinic acid.

As in true amber, the odd insect or leafy fragment has sometimes found its way into the resin before hardening, and doubtless this suggested stimulating tourist-interest by melting the material (it melts at a temperature of 360° to 450° F.) and pouring it over some unfortunate bug. For wherever the visitor wanders in New Zealand, more especially in the North Island, he is confronted with lumps of kauri gum in varying shapes and sizes complete with insect or flora inclusions, sometimes more than one inclusion to a lump. Magnificent beetles, moths, even minute lizards, caught up in life, are beautifully preserved till the gum itself meets disaster. It is, in fact, merely a question of choosing your insect. Most jewellers stock this gum and souvenir shops go in for it in a big way—or did before the war. Recalling the rarity of an insect in amber and the speculation that is part of the amateur's discovery, one's first reaction to kauri gum and its inclusions is to wonder whether insects of the Antipodes are more gullible than in other parts of the world. The next surprise is to find that nobody, not even the jeweller, knows or cares to admit how it is done and where. One or two might talk of a secret process and the man said to be responsible is always in some other town. If you go to this town and make the same enquiries he is back in the one you came from. When I eventually met the responsible party it was to learn again that the process was secret but that all insects were mercifully chloroformed before the operation.

Due to the fact that this type of gum will one day be extinct (unless other gums are discovered or the copal gum of Africa becomes an issue), and also due to its necessarily short existence in use, it is one of the substances that should bother the gemmologist less and less. But, like medicine, for every satisfactory cure of one disease there are two new exciting diseases ready and waiting. And if man has cut gum short in its efforts to become amber it is almost certain that something else far more complex is in nature's crucible.

[1] *The Book of Amber.* G. C. Williamson.

Two Fellows of the Association have reported that they possess a copy of a book on Precious Stones printed in London in 1652, of which the title page reads:—

A Lapidary of The History of Pretious Stones

With cautions for the undeceiving of all those that deal with Pretious Stones.

By Thomas Nicols, sometimes of Jesus College in Cambridge.

Inest sua gratia parvis

Cambridge: Printed by Thomas Buck, Printer to the Universities. 1652.

The following extract from a chapter dealing with the " adulteration of Gemms " will, no doubt, interest readers.

" Any thoroughly transparent tinctured gemm what ever, may be adulterated by two Saphires, or with two Crystalls, having a foyl betwixt them. But such duplicated gemms, which are tinctured either with a foyl of Mastick, or with other coloured foyls in their intermediate space, are thus ordinarily and usually discerned by Jewellers ; they will take the gemm and put it upon their thumb nail, and then direct their sight betwixt the plain of the gemm and of their nail ; and if the upper part of the gemm be white, and no colour be added (which lying hid under the sides of the cistæ can there be perceived) then the upper part of the gemm will plainly appear white as it is, and so it will discover it self to be an adulterated gemm instead of the naturall one. This is a very easy way to discover factitious gemms from naturall ones. But those factitious gemms which consist of many angles fitted for this purpose, by various sections, hollowings, and excavations cannot so easily be perceived, because the reflections from the angles, do give tincture from the foyl in every part of the superficies of the gemm. Another kind of ingenious fraud there is, by which gemms are adulterated, and that is when as cunning Artists do excavate a gemm, as a white Saphire, or a Crystall, in the lower part of it with a very small foramen, and then infuse into it a drop of some transparent liquour, which being artificially done, will very excellently diffuse its colour through the body

of the whole gemm: Thus the idea's of true Rubies, Saphires, Samaragdes are produc'd. There is another kind of way of subtill fraud in gemms, when as cunning sophisticatours do macerate gemms in coloured or tinctured waters, or so tincture them in fire, or by any other means, that the tincture or colour may enter the body of the gem. These frauds can no otherwise be discovered, but by taking the gemms out of their cistis, enclosures or settings, and so taking a naked view of them with full sight. As for other gemms which are dissembled with tinctured glasse, these for the most part seem to have a pellicula or little film in their superficies, as if they were anointed with oyl, which is never to be found in true gemms. There are factitious gemms made of Crystall, and of flints, and lead, which will be harder then the common glass, and transparent as Crystall, in the making of which, to tincture them, cunning artists are wont to adde metalls to it or tinctures, or colours of metalls, and thus they being committed to the fire, by the operation of the heat upon them, will be produced a gemme scarcely to be discerned from the true gemm, have only by the atomes in the middle of their bodie, and by those small bullæ which are often caused in them by the unequall working of the fire upon their matter, or by the extreme behemencie of its heat. Of these kinds of factitious gemms there are some so perfect, and free from the small bullæ and atomes, as they can no wayes be discerned from the true gemms but by the use of the file ; for these may be filed, the true ones cannot, except onely the Topaz and Samaragde: and by their gravities, weight and ponderosity ; for these factitious stones are much heavier then the true, as consisting of lead and metalls, which are very ponderous and weighty ; and by their pining, dead, fading look, which if they be long beheld, do afford no pleasure to the eye by feeding it ; whereas in true gemms there is always a lively splendour, which by reason of the reflections of the severall tables or sides of the superficies, gives it self forth with the more sparkling delight.

Another way of adulteration of gemms there is, very subtill, and more excellent then any of the former, which is this, Cunning Chymists will make a lapidifick water mineralls, and then poure of it into waxen forms, which forms they will immerge for some time in an indurative water, and thus produce a gemm not unlike to the true."

OFFICIAL NOTICES

HONORARY FELLOWSHIPS

The Council of the Association has awarded Honorary Fellowships to William Francis Porter McLintock, D.Sc., F.R.S.E., F.G.S., Director of H.M. Geological Survey and Museum, and Walter Campbell Smith, M.C., T.D., M.A., Sc.D., F.G.S., Keeper of Minerals in the British Museum of Natural History, for the services that they have rendered in connection with the study of gemmology.

EXAMINATIONS

The 1947 Examinations in Gemmology were held in Great Britain on June 25th, 26th and 27th at various cities, and also in Australia, Canada, U.S.A., Mexico, India, Ceylon, Denmark, Hong Kong, Holland, Palestine, Siam and South Africa.

1947/1948 COURSES IN GEMMOLOGY

The 1947/48 Classes and Courses in Gemmology will commence in the last week of September, 1947. Classes will be conducted at the following centres in Great Britain:—

London. Chelsea Polytechnic, S.W.3.
Edinburgh. Heriot-Watt College.
Glasgow. Stow College.
Birmingham. Jewellers' and Silversmiths' School.
Plymouth. Plymouth Technical Institute.

The Correspondence Courses (Preliminary and Diploma) will be conducted on the usual world-wide basis.

Information about the Classes or Courses may be obtained from the Secretary of the Association.

GIFTS TO ASSOCIATION

The Council records with appreciation the following donations that have been made to the Association during the first six months of 1947:—

Mrs. Gwen Parry, £21.
Sir James Walton, £4 4s.
John H. Pope (Australia), £5 5s.
M. D. S. Lewis, £2 2s.
A. S. Murray, £2 2s.
H. R. Gooch, £1 1s.
F. Bryan, £1 1s.

AUTUMN DANCE

An Association Dance will be held at the Victoria Halls, Bloomsbury, London, W.C.2, on Thursday, October 16th, 1947, from 7 p.m. until midnight. Further details will be sent to all members in due course.

FIRST GENERAL MEETING

The First General Meeting of the Association, since the date of Incorporation, was held on Thursday, June 19th, 1947, in the Hall of the Chemical Society, Burlington House, London, W.1. The Officers and Council of the Association elected for the ensuing year are:—

Officers.—President: Dr. G. F. Herbert Smith, M.A., D.Sc. Chairman: Mr. F. H. Knowles-Brown, F.S.M.C. Vice-Chairman: Dr. G. F. Claringbull, Ph.D., B.Sc., F.G.S. Honorary Treasurer: Mr. S. F. Bones.

Council.—Sir James Walton, K.C.V.O., Messrs. B. W. Anderson, R. Blott, G. Clarkson, M. L. Crombie, T. G. Jones, R. Webster, J. H. Stanley, E. R. Levett.

During the discussion that followed the Meeting it was advocated that post-diploma students might prefer to work to a set course rather than to study individually. Suggestions made included the holding of specialist lectures, talks given by Fellows and provision for refresher courses. The Council will endeavour to meet these needs according to the accommodation available.

Helpful suggestions regarding the *Journal of Gemmology* were made, the general impression being that members desired the articles to be of academic nature.

In the Autumn the history of the Association from 1908 will be brought up to date, as well as statistical information, and will be published in a Year Book containing the Constitution and Bye-Laws and a list of Fellows and Members.

TALKS BY FELLOWS. JANUARY-JULY, 1947

February.—S. T. Solomon, F.G.A., Launceston Rotary Club, February 17th. Subject: "Gemstones." F. Leak, F.G.A., Bristol and West of England Jewellers' Association (Western N.A.G. Section), February 20th. Subject: "Science of Jewellery."

March.—J. Gilloughley, F.G.A., Paisley Philosophical Institution, March 18th. Subject: "Gemstones." T. H. Bevis-Smith, F.G.A., Talks for staff training purposes, March 13th and 20th. Subject: "Synthetic Gemstones." A. R. Popley, F.G.A., staff training talk, March 21st. Subject: "Jewellery Manufacture."

April.—F. Leak, Toc H, Mark IX Group, April 14th. Subject: "Science of Jewellery." S. T. Solomon, F.G.A., Plymouth Soroptomists, April 11th. Subject: "Gemmology." R. Webster, F.G.A., London Central School of Arts and Crafts, April 25th. T. G. Jones, F.G.A., London Central School of Arts and Crafts, April 18th.

May.—F. Leak, F.G.A., Bristol Toc H (Women's Section), May list. Subject: "Science of Jewellery." W. A. Peplow, F.G.A., Stourbridge Inner Wheel Club, May 13th. Subject: "Jewels."

ASSOCIATION DINNER

The President, Dr. G. F. Herbert Smith, M.A., D.Sc., presided at the First Annual Dinner of the Association, which was held at the Waldorf Hotel, London, W.C.2, on Thursday, May 15th, 1947. Dr. W. F. P. McLintock, D.Sc., F.R.S.E., Director of H.M. Geological Survey and Museum, Sir Lewis Fermor, O.B.E., F.R.S., former Director of the Geological Survey of India, Dr. W. Campbell Smith, M.C., M.A., Sc.D., Keeper of Minerals, British Museum of Natural History, Mr. G. R. Hughes, C.V.O., Clerk to the Worshipful Company of Goldsmiths, Mr. I. Short, President of the British Jewellers' Association, Mr. J. Lees, Chairman of

the London Wholesale Jewellers' Association, Mr. R. D. Dale and Mr. C. D. Sonn, of the Diamond Trading Company, Mr. H. B. Southam, M.B.E., Mr. J. Pike and representatives of the Trade Press were present as guests of the Association.

Members present, representing kindred organizations, were Mr. J. J. Holgate, Chairman of the National Association of Goldsmiths, and Mr. A. W. Blott, Chairman of the London Jewellers' Council.

The Chairman of the Association, Mr. F. H. Knowles-Brown, proposed the Toast of the Guests, and Dr. W. F. P. McLintock responded. Sir Lewis Fermor proposed the Toast of the Association and the reply was given by the President.

Fellows and Members present included:—R. V. Blott, S. F. Bones, J. Blott, E. Bamber, T. H. Bevis-Smith, G. Blythe, M. L. Crombie, T. P. Cuss, D. Corfield, W. B. Crombie, Mrs. H. Corfield, J. K. Cairncross, H. Cropp, Miss V. M. Benson, E. C. Cull, H. C. Diss, M.B.E., J. F. Croydon, F. E. L. Clarke, Miss K. Dyson, G. F. Claringbull, Ph.D., B.Sc., Mrs. E. Holdsworth, N. Harding, O. D. Fahy, T. G. Jones, Mrs. M. Meisl, J. S. Miles, G. Lindley, Mrs. G. Lindley, T. L. Ellis, R. Lucas, R. K. Mitchell, E. H. Neale, N. A. Harper, A. Kermeth, A. G. Nicol Smith, D.S.O., W. N. Kennedy, M. D. S. Lewis, B.Sc., Mrs. G. Parry, B.Sc., K. Parkinson, S. F. Redknap, J. W. Reynolds, Mrs. A. M. Sharpe, A. W. Peplow, A. R. Popley, T. G. Shenton, J. H. Stanley, J. H. Saunders, E. Trillwood, S. C. Sears, W. A. Perry, S. T. Solomon, Sir James Walton, K.C.V.O., H. Wheeler, D. Wheeler, F. Waller, Miss C. Watson, R. W. Yeo, J. B. Mennie, R. Webster, G. F. Andrews, Dr. W. Stern, F. E. Ullmann, Miss W. Willis.

AUSTRALIAN VISITOR

The Association recently had the pleasure of a visit from Mr. M. Stevenson, F.G.A., of Adelaide, Australia. Chairman of the South Australian Branch of the Gemmological Association of Australia, Mr. Stevenson was extremely interested in the activities of the British organization. He gave encouraging news of the rapid expansion of the Australian Association.

Mr. Stevenson is one of a small band of Australian Jewellers who have qualified in the British Association's Examinations. In addition to Mr. Stevenson, who is a 1927 Diploma holder, there is Mr. J. H. Pope, of Melbourne, Diploma 1946, and Mr. J. Henderson, also of Melbourne, who is an Associate.

AMERICAN VISITOR

On his return to America from a visit to the Middle East Dr. A. E. Alexander, Ph.D., Director of the Gem Trade Laboratory, New York, broke his journey at London to visit the London Gem Testing Laboratory and to discuss experiences with Mr. B. W. Anderson. During his visit Dr. Alexander found time to visit the Gemmology Classes at Chelsea Polytechnic, where he was interested in the work of post-diploma students, and also to visit retail jewellers in the West End of London. He also had an opportunity for meeting his war-time counterpart in Mr. T. G. Jones, as both were then engaged upon similar work connected with the insulating of sparking plugs, Dr. Alexander's visit has been much appreciated by all those who had the pleasure of meeting him during his brief stay in London.