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and

PROCEEDINGS OF THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

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GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

(Originally founded in 1908 *as the Education Committee of the National Association of Goldsmiths, reconstituted in* 1931 *as the Gemmological Association)*

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GEMMOLOGICAL NOTES

By A. E. FARN, F.G.A.

ON Dartmoor recently I sat on a granite boulder and thought of my colleagues at the laboratory—I was on holiday and I suppose it was the stones, boulders, etc. which caused me to think of the laboratory and inevitably other stones of interest. Sometimes considerable interest is aroused in very ordinary subjects when seen in slightly varying guises. To a gemmologist, albeit a commercial gemmologist such as myself, gemmology embraces those gemstones usually set in jewellery for retail distribution, i.e. rubies, diamonds, emeralds, all the way down through chrysoberyl, topaz to peridot, tourmaline, garnet and the ubiquitous quartz family. The more exciting and consequently rarer gemstones, which are vintage wines compared with the normal "vin rouge ordinaire" of everyday diet, are by their exceptional qualities rare and perhaps not conducive to digestion. Quite recently a diamond dealer brought to the laboratory an octahedron of colourless material which normally one would expect from a diamond dealer as being part and/or parcel of his normal stock. In Hatton Garden diamond octahedra are common enough, being the rough from which brilliant-cut stones are fashioned, so why have it tested? In the laboratory of the London Chamber of Commerce we are never (I hope) visibly surprised at the most obvious tests, such as 10ct.

obvious synthetic ruby or straightforward yellow quartz. We realise that our customers very often know the true nature of their goods and that the test is merely to obtain an unbiased authority to quote in the case of valuation for replacement, probate, or some reason, so that we were not entirely surprised by a dealer offering an octahedron for testing. We on the other hand assumed (always dangerous) that here we had a synthetic spinel purposely made to deceive (since no diamond dealer would ever be worried whether diamond or not). Such a dealer would know his diamonds but not necessarily their simulants.

To commence testing with preconceived ideas is always dangerous and usually leads to needless testing by trying to establish a concept which may be the figment of a fertile imagination.

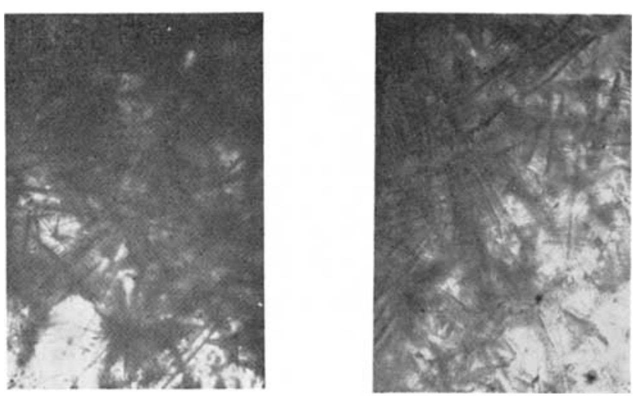
We took a distant vision refractive index measurement of the octahedron since it had slightly curved faces with worn edges. The reading obtained did not fit our ideas of synthetic spinel, in fact a rather poor indication about 1·44 seemed to be too far away, to be accurate. One thing diamond will do is to fluoresce (usually milky blue) under X-ray excitation. This stone did not. It fluoresced a violet-mauvish colour which is a characteristic of yttrium aluminate (YAG)—one of man's latest contributions to the never ending list of diamond simulants. Inspection by microscope showed a form of three-phase inclusion which precluded synthesis so far as we know. A three-phase inclusion indicated beryl to me so we viewed it through the Chelsea colour filter, as all colourless or near colourless beryls will take on an added hint of green. This octahedron however remained obstinately colourless.

Having hovered around somewhat aimlessly trying to short-circuit testing by preconceived ideas we decided to do some gemmology for a change. Using known density liquids we found the specimen sank in bromoform and floated in methylene iodide and at last we decided it had to be fluorspar. The octahedron fluoresced mauve under ultra-violet, and between crossed polaroids it was singly refracting. The distant vision method was doubly checked and a strong hint of 1·44 appearing merely confirmed what is pretty obvious when read; but it lightened a routine day with just a touch of gemmology pure and fairly simple to show how a too commercialized approach by professional gemmologists can go wrong.

As soon as one mentions doublets then one is prepared for all kinds of variations. Recently an opal in a pendant was sent for testing. Now anyone can tell once a stone is out of a setting and the girdle exposed. However, when one *suspects* an opal doublet which in a setting is somewhat flat (but not too flat) and of good colour-play on top and fairly good complementary colour below, it behoves one to do something other than to suspect it. Usually (a dangerous word) opals which are subtranslucent will allow light through when viewed under the microscope. This one did and in fact look absolutely right, but the setting edge of the pendant showed a small crimped mark as if a skilled setter had unset and reset the stone. The stone to me was slightly loose in its setting and had a fractional shake. Being commercially minded and always suspicious I couldn't help but think that if someone had had this opal out they would have only put it back if it was a doublet. However, it was subtranslucent—most unusual in a doublet—and it had a good colour-play below the girdle. Close inspection by microscope did not reveal any squeezed-out bubbles of air sometimes seen in doublets, but certainly there were some somewhat irregularly shaped transparent patches which all appeared to be in one plane. Having had a good deal of experience of doublets of all kinds this plane emphasized our suspicion.

We decided to tell our customer the stone would have to be taken out of its setting and did not expect to see him again, because by the time he had spent money on resetting, the obvious would be there to be seen and that would be that. However to my pleasure and surprise he turned up next day to ask for a certificate on what now showed itself to be a normal opal-on-opal doublet, looking as if it were connected by black Bostick. This may sound obvious but it is a little unusual to find a doublet which is translucent and I feel that a little gemmological know-how could lead a gemmologist who is a dealer to make a mistake with the stone in its setting if only a lens were used.

Suspicion or a suspicious nature are necessary to a professional gemmologist. Recently we were sent three small green subtranslucent cabochon stones in a cellophane envelope marked "Imitation Jade". On inspection they didn't look like jade (nephrite or jadeite varieties). They had originally, I believe, been stuck to cloth or paper as samples, and under the microscope the two smaller stones had bubbles of adhesive and shreds of material adhering and they looked very unprepossessing. Neither of the smaller stones weighed much above a quarter of a carat and a cabochon of ¼ ct. is not a large stone. If I could have passed the test to someone else I would have done so. However after leaving the two smaller stones to soak in a detergent liquid I looked at the third and largest stone. Under the microscope it showed a beautiful structure of something like fern leaves in radial formation. They were so prolific but so regularly irregular that I knew they had to be an artifact structure since nothing I had ever seen except crystal structure in a chemical test ever had such a profuse repetition. They were in fact a formation somewhat similar to purpurine glass sometimes seen in pinchbeck mounts used for seal-stones. They were a form of devitrification and were so lovely that I asked R. K. Mitchell to photograph them. Having thrilled myself over a piece of glass I returned to the two smaller stones. As they were so small I knew it would not do the standard refractometer table any good by trying a distant vision reading and they were too small for a reliable S.G. I decided to consult an authority on jade substitutes and noted a fact which I had forgotten for the immediate moment. Green grossular garnet fluoresces an apricot-yellow under X-ray excitation. Our two small cabochons obliged by so doing—I felt grateful for a happy decision on what could have been a very small and trying subject. Most of all I was pleased with the visual test of inclusions under the microscope which seen as they were in colour and depth really made one feel happy to be a commercial gemmologist.



Fernleaf-type inclusions in radial formation similar to those seen in purpurine glass.

TOURMALINES: RARE MULTIPLE INDICES ON THE REFRACTOMETER

By C. A. SCHIFFMANN, F.G.A., G.G.
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IN optics, some of the laws proceeding from the study of natural phenomena have been formulated so long ago, demonstrated and proved so repeatedly, as to be consciously adhered to by generations of students and regarded as immutable concepts. This also applies to the laws of light propagation in birefringent media.

Occasionally an abnormal behaviour observed in practice differs so manifestly from the rule that the observer is forced to say that this cannot be. Investigation is then required to try to elucidate the phenomenon. This paper deals with refractive index anomalies of cut tourmalines, as observed on the refractometer.

Let us now consider the practice. The appearance on the refractometer scale of an uniaxial birefringent mineral like the flat surface of the cut tourmaline is so well known that it hardly requires a detailed description: let us only mention the two sharp shadow edges at their greatest separation, as seen on an Anderson-Payne spinel refractometer (Fig. 1). If anyone with a knowledge of gems was told that tourmalines have four shadows on their refractometer they would say this is not possible. This would be an understandable reaction as it is a phenomenon which must be seen with one's own eyes in order to ascertain it. Anomaly in this behaviour has been reported (1967) by R. Keith Mitchell(1), each one of two dark green cut tourmalines from Brazil showing four distinct shadow edges on the refractometer scale as observed in sodium light, at 1·653 and 1·646 for the ordinary ray and at 1·624 and 1·620 for the extraordinary ray.

This curious behaviour seems to be extremely rare among cut tourmalines. The present author became interested in the problem and was able to locate some cut tourmalines showing this effect of multiple readings on the refractometer scale to a more or less pronounced degree.

Description of the specimens

The colours of the cut specimens examined were yellowish green, green to bottle green, bluish green, varying from medium light to dark tones. The stones were said to come from Africa and were homogeneous clear specimens.

The work was carried out in monochromatic sodium light. The observations were purposely made on an Anderson Payne spinel refractometer because of the advantage of the spreading of the scale in the refractive indices range for tourmalines. This gave a clearer separation of the basic indices and of their satellite shadows thus enabling an easier interpolation of the third decimal.

To eliminate any error caused by possible defects of the instrument and to ascertain its accuracy, a normal tourmaline was first tested on it, showing the two clear-cut shadows as seen at their greatest separation at 1·642 for the ordinary ray and 1·623 for the extraordinary ray (Fig. 1).

As a further check, the most typical of the anomalous tourmalines with satellite shadows was tested on the following series of refractometers of different models:

1. a Rayner Diamond Prism Refractometer
2. a Rayner Glass Prism Refractometer
3. a second Rayner Glass Prism Refractometer
4. the Anderson-Payne Spinel Refractometer from Rayner used for all the current work mentioned in this paper
5. an Erb and Gray Refractometer
6. a GIA Duplex Refractometer

FIG. 1. Typical refractive indices of a normal tourmaline as seen on an Anderson-Payne spinel refractometer, with ω=1·642 and ε=1·623 in sodium light.

FIG. 2. Anomalous refractive indices of a tourmaline, the two basic indices ω=1·642 and ε=1·623 being accompanied by satellite shadows, see text.

On all these instruments the same effect was clearly observed on the table facet as well as on the largest of the rear facets to give a reliable reading. Of course the satellite shadows appeared more cramped together on some of the instruments used owing to the lesser length of their scales than on the Spinel model.

During the course of testing it was a great surprise to discover that, whereas some tourmalines produced the doubling effect of the two basic indices (four shadows in all), some others showed a triple effect (six shadows in all) more or less developed, that is, three clearly separated shadows for ω, whilst for the ε ray the first satellite shadow was found to be so close to the basic shadow as to be only just separated on the scale, both limits being almost overlapping. Such a case is illustrated in figure 2 with the following indices:

	Basic	*First satellite*	*Second satellite*
ω	1·643	1·646	1·656
ε	1·623	$1{\cdot}623^{+}$ so close to basic index as to be indistinguishable on the photograph	1·626

One most remarkable tourmaline of green colour reached some kind of a record by exhibiting a four-fold effect for both rays, that is both of the two basic rays being accompanied by three satellite shadows (or eight shadows in all). The readings of this remarkable specimen are illustrated in figures 3 and 4. The effect is as follows (Fig. 3):

When the stone is lying in an orientation with its c axis in line with the optical axis of the refractometer, only the ordinary ray is visible with its basic shadow situated at 1·645. Reading up the scale, next comes a narrow lighter zone, followed by a sharp, narrow shadow line at 1·647 (first satellite line); then comes another slightly larger light zone followed by a slightly less sharp shadow at 1·652 (second satellite line) then comes again a broader light zone followed by a somewhat less sharp, broader shadow lying at 1·660 (third satellite line).

While revolving the stone on the prism of the refractometer it was noticed that each one of the basic index as well as of its satellites moved down the scale until they reached the point of maximum separation corresponding to the position of the ε ray (Fig. 4) with shadows at $1{\cdot}623^{+}$, 1·624, 1·625, 1·629.

FIG. 3. Anomalous refractive index of a tourmaline showing the basic ray at 1·645 accompanied by 3 satellite shadows, that is, 4 shadows in all. See text.

FIG. 4. Same stone as in figure 3. Stone revolved 90° to show both rays. See text.

The two basic indices being clearly recognizable, the birefringence has been calculated by subtraction between these ones without considering the satellite shadows for which no reason is known so that it would be too early to ascertain that the last ones are due to true birefringence.

It was noticed that for all stones the edges of the shadows of the basic indices were very sharp and that the sets of satellite shadows became progressively less sharp, the effect being more obvious for the higher shadows (of the ω ray) than for the lower ones (of the ε ray).

The following table gives a survey of the figures observed.

Range of basic refractive indices and birefringence of the tourmalines showing multiple shadows on the refractometer.

	Double shadows	*Triple shadows*	*Quadruple shadows*
$\omega \pm$ ·001	1,640 to 1,647	1,641 to 1,647	1,645
$\varepsilon \pm$ ·001	1,620 to 1,625	1,623 to 1,625	1,623^{+}
Birefringence	·020 to ·022	·018 to ·022	·021^{+}

For clarity not all figures observed are tabulated below; only typical values of individual stones are given.

Colour of the stone	4 *shadow effect* BLUE–GREEN		6 *shadow effect* MEDIUM GREEN			8 *shadow effect* DARK GREEN			
	basic	*satellites*	*basic*	*satellites*		*basic*	*satellites*		
ω	1,643	1,648	1,644	1,648	1,658	1,645	1,647	1,652	1,660
ε	1,623	1,624	1,624	1,624^{+}	1,627	1,623^{+}	1,624	1,625	1,629
Birefringence	·020	—	·020	—	—	·021^{+}	—	—	—

Regarding other properties, the dichroism was normal for tourmalines, strong; the colours being green and yellow-green for green specimens and pale blue and dark ink blue for the blue-green ones. The absorption was strong along the direction of the ordinary ray.

The specific gravities measured by the hydrostatic method were found to range for the individual specimens between 3·07 and 3·13, all stones tested being clear and free from vitiating factors (no cracks or large heterogeneous inclusions). With the stones immersed in carboneum sulfuratum with n_d 1·625, microscopic examination revealed most interesting features in some specimens. These were narrow fissures open at the surface of the stones' facets, offering different aspects according to the orientation of the particular facet with regard to the crystallographic directions.

On long facets cut in a plane parallel to the prism edge (the usual orientation for rectangular tourmalines with their long side corresponding to the length of the prism) the fissures are running in roughly parallel sets, some of them being abruptly interrupted whereas new ones start in a laterally slightly displaced position (Fig. 5).

Sometimes, the fissures are interrupted by roughly perpendicularly lying, slightly waving cracks (which look like tension cracks), whereas new fissures occur again in a displaced position on the lip of the crack (Figs. 6 and 7). At one place, two fissures meeting at an acute angle were lying across the set of main fissures; on both sides of this feature the main fissures do not run exactly in the same direction, but at a slight angle (Fig. 8).

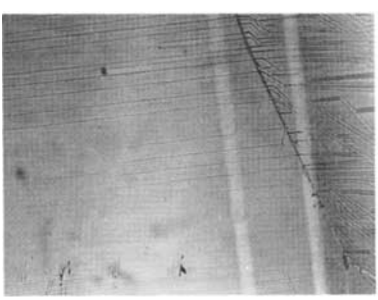

FIG. 5. Tourmaline, fissures open at the surface. Magn. 32 ×, immersion n_d 1·625.

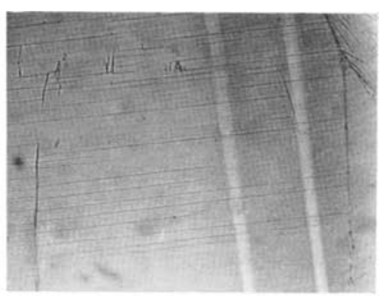

FIG. 6. Tourmaline, fissures open at the surface. Magn. 32 ×, immersion in n_d 1·625

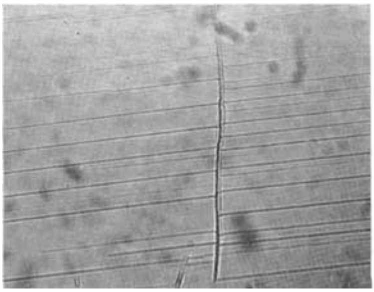

FIG. 7. Tourmaline, fissures open at the surface, interrupted by a tension crack. Same specimen as on Fig. 6, magn. 60 ×, immersion in n_d 1·625.

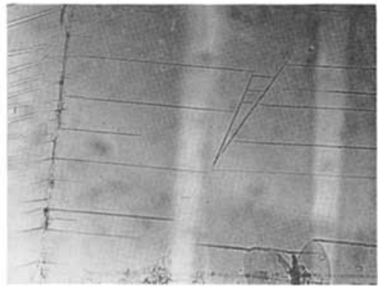

FIG. 8. Tourmaline, fissures open at the surface. Alignment of the main fissures displaced by additional fissures across them. See text, Magn. 60 ×, immersion in n_d 1·625.

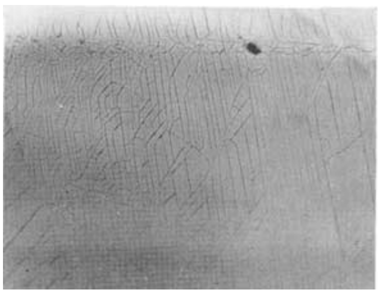

FIG. 9. Tourmaline, fissures open at the surface. Criss-cross pattern on a facet cut across the long axis of the original crystal. The straight zone of smaller patterns at the top of the photograph is the girdle plane. See text. Magn. 32 × immersion in n_d 1·625.

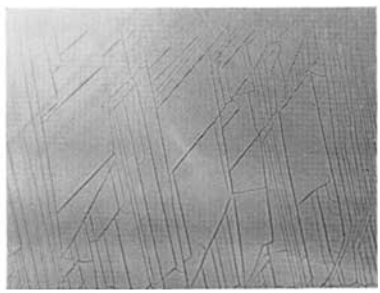

FIG. 10. Tourmaline, fissures open at the surface. Roughly lozenge shaped patterns on a facet cut across the long axis of the original crystal. Magn. 60 ×, immersion in n_d 1·625.

In the Figs 5 and 8, most of the surface of the photograph represents a large facet cut parallel to the prism edge; on the left part of both photographs the next adjoining facet partly visible is cut across the edge of the prism, being part of the small side of the facetted stone. At the junction of both facets, the fissures are seen to bend in other directions, forming irregular patterns of criss-cross lines. This is more distinct when looking in a direction normal to the plane of that facet at the small end of the stone (Fig. 9).

Here the complexity of the design, bordered at the top of the photograph by a straight zone of smaller patterns (this is the plane of the girdle) and on the left by an oblique facet junction edge, past which the fissures run away in another direction, gives the impression that the stone is composed of a bundle of fibres closely packed together to resemble a bunch of asparagus, the facet representing a cross section through it.

Another spot shows more distinctly the patterns of the criss-cross lines (Fig. 10). Examination between polars (partly crossed, to enable some light to pass in this direction nearly along the c axis) shows that the specimen is under strain.

From their appearance, it is evident that these fissures are not defects due to the cutting process, but are related to the texture of the crystals. The reason for these unusual features is not yet understood, nor is it known if there is a correlation with the refractive indices with multiple shadows.

FIG. 11. Tourmaline, same view as on Fig. 10, under not quite completely crossed polars to show internal strain.

One might suggest that firing tourmalines might have had an influence on the existence of the phenomena and perhaps cutting under certain conditions would have caused a sort of Beilby layer to develop modifying the optical properties at the surface.

However, such an explanation seems improbable, as M. D. S. Lewis reports[2] in a paper dealing with the formation of a Beilby layer on crystals: "The fully amorphous layer where it exists is far too thin for effect on refractive index", and further "Mrs. G. Parry who has made extensive researches into the limiting thicknesses of films capable of giving a shadow edge on the refractometer, has kindly provided the writer with some of her calculations. If polished quartz were covered by a layer of amorphous silica, the thickness of the film would have to be about 3000 Ångströms before it would give a reading corresponding to the lower refractive index and with most other gemstones it is of the same order, assuming similar differences between refractive indices of amorphous and crystalline material. Refractometric readings are therefore useless in attempting to detect the presence of amorphous layers due to polish".

As the sets of fissures and the geometrical patterns are not present on all specimens examined, it may be possible that particular conditions during the cutting process have had an influence on their formation.

Further investigation is being carried out on this subject.

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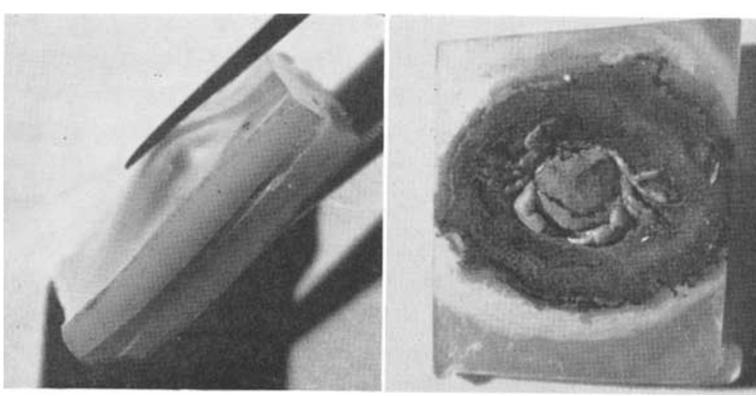
2. The structure of Gemstones, M. D. S. Lewis, Part V, Gemmologist, Vol. XVII, No. 203, June 1948, p. 149.

BLISTER PEARLS

MR. VAN DEN BERGE of Belgium, who recently purchased a blister pearl, decided to find out what had caused the blister. He cut away the base and the cause of the irritation was seen to be a very tiny crab.



USUAL AND UNUSUAL INCLUSIONS IN A PERIDOT SPECIMEN

By T. F. ZOOK

THIS adventure into the microscopic world of peridot inclusions started with the purchase of a highly flawed, oily-green, ten carat, cushion-cut peridot of unknown origin, as a study specimen. The diameter of the stone at the girdle measured 12 millimeters and its depth from table top to the culet measured eight millimeters.

To the unaided eye the specimen appeared to have, when observed through the table, numerous round "flying saucers" of different sizes. In examining other portions of the stone through the surrounding crown, there appeared to be a dense area of inclusions of an elongated, muddy nature in the pavilion near the girdle.

Examination with a ten-power lens did not resolve sufficiently the inclusions for exacting study. Both 10 × and 30 × magnifications with transmitted light in a binocular diamond grading microscope and magnifications of 25 ×, 50 ×, 100 × and 200 × by transmitted light in a monocular Bausch and Lomb microscope were then used. Photomicrographic studies numbers 1, 2 and 3 show the appearance of the specimen by transmitted light at a magnification of 10 ×.

Under microscopic study, the round "flying saucers", as seen previously, were found now to be of four types:

(1) Platelets of an oval shape which enclosed within their perimeters a relatively clear host material which, in turn, contained tiny long clear thin flat platelets, small black and shadowy opaque bars parallel to the thin platelets and minuscule black opaque "pepper" specks. The thin clear platelets reflected rainbow colours when no polaroids were used, but showed a rather indistinct extinction when polaroid discs were inserted and crossed and uncrossed (photomicrographs numbers 4 and 9).

Roedder and Weiblen, who have studied the petrology of silica melt inclusions in olivine specimens from Apollo 11 and 12 and compared them with olivine specimens from the prehistoric Makaoupi and the Kilauea Iki lava lakes in Hawaii, have reported

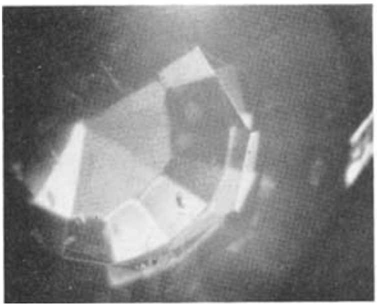


FIG. 1. Peridot—"flying saucer" inclusions table up, 10 ×, transmitted light.

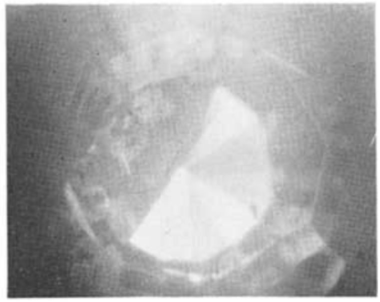


FIG. 2. Peridot—"flying saucer" inclusions table up, 10 ×, transmitted light.

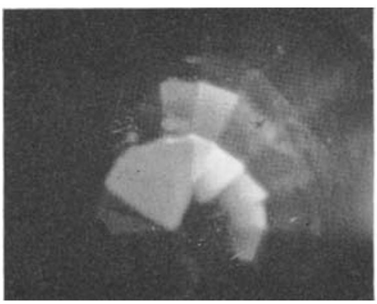


FIG. 3. Peridot—"flying saucer" inclusions culet up, 10 ×, transmitted light.

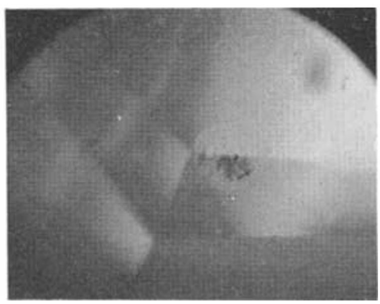


FIG. 4. Peridot—oval inclusion, one type of "flying saucer" inclusion at a magnification of 25 ×, transmitted light.

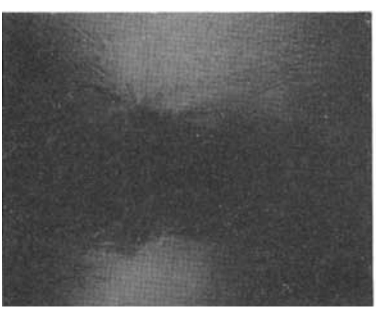


FIG. 5. Peridot—oval inclusion of still another type of "flying saucer", 100 × magnification, transmitted light.

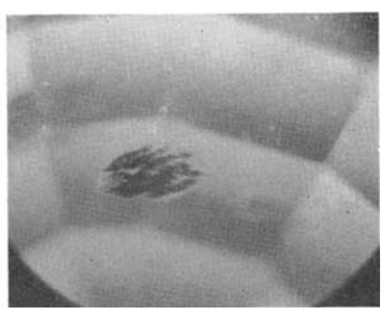


FIG. 6. Peridot—pseudo-hexagonal inclusion, two stacked "flying saucers" filled with brown satiny material, 25 × magnification, transmitted light.

similar inclusions. They were surprised to find in an olivine from the prehistoric Makaopuhi lake in Hawaii a melt inclusion which looked almost identical to those found in the Apollo 11 and 12 samples. These melt inclusions found by Roedder and Weiblen resemble so closely the inclusion shown in photomicrographs numbers 4 and 10, that their electron probe analysis is probably applicable to the present inclusion. Their analyses identified the tiny dark opaque lines as thin plates of ilmenite (these lines appear in photomicrograph number 4 near the tiny opaque "pepper" inclusions); the tiny thin flat light platelets were identified as plagioclase and they lie parallel to and adjacent to the ilmenite platelets; and the minuscule black opaque spots (which appear as "pepper" specks in the present study) as tiny pyroxene crystals. The enclosing host material was identified as olivine(1). In laboratory experiments, Roedder and Weiblen were able to take sample material from the Hawaiian olivines mentioned and by heating them to homogenize the material. Then, when they slowly cooled the material from 1120°C to 1020°C over an 11 day period the material renucleated several black ilmenite plates(2).

The experiments conducted by Roedder and Weiblen on reheating olivine grains in a vacuum at progressively higher temperatures with subsequent quenching and examination established the following sequence of phase changes: first recognizable liquid stage at $<1065°C$; then plagioclase crystallized out at $1103 \pm 3°C$; then pyroxene crystallized out at $1130 \pm 5°C$; and finally ilmenite crystallized out at $1210 \pm 5°C$. These experiments on melt inclusions in olivine they believe provide rough estimates of lunar and terrestrial lava temperatures and cooling rates(3).

(2) Platelets of an oval form which enclosed clear material except for a tiny black centre are very similar to the microlites of chromite reported by Gübelin(4) (see number 5).

(3) Platelets of a pseudo-hexagonal form filled mostly with satiny downy material which is separated partially in the interior of the platelet by clear irregular veins were also found (photomicrograph number 6 taken at a magnification of $25 \times$).

The platelets just described are probably the mica biotite since they follow very closely Dana's description. He states that biotite is sometimes found in scales of basal cleavage which yield pseudohexagonal crystalline forms which when very thin in transmitted

FIG. 7. Peridot—pseudo-hexagonal inclusion and large dendritic feather inclusion 25 × magnification, transmitted light.

FIG. 8. Peridot—large dendritic feather inclusion, 25 × magnification, transmitted light.

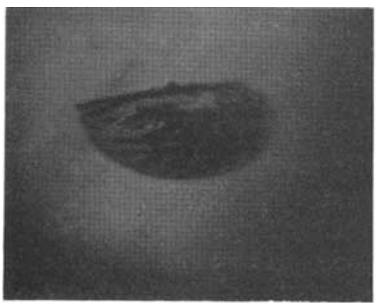


FIG. 9. Peridot—melon slice or lady's handbag inclusion, 100 × magnification, transmitted light.

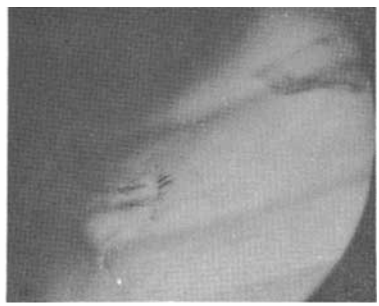


FIG. 10. Peridot—two oval "flying saucer" inclusions, unidentified "frozen in motion" inclusion 25 × magnification, transmitted light.

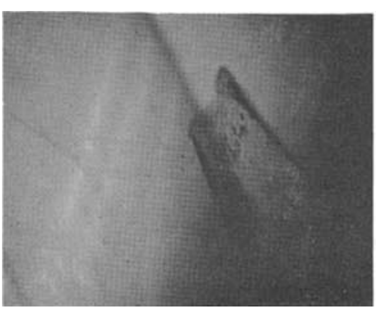


FIG. 11. Peridot—two juxtaposed unidentified inclusions, 50 × magnification, transmitted light.

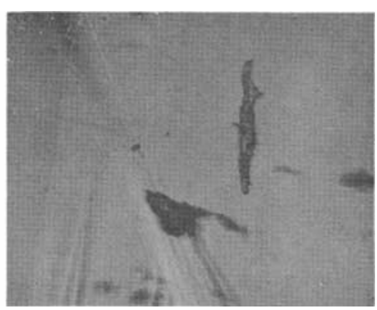


FIG. 12. Peridot—unidentified inclusions, 100 × magnification, transmitted light.

light may show up as having a brown (or green, blood-red, pale yellow to dark brown or rarely white) nature[(5)].

(4) Pseudo-hexagonal platelets, which are black and which appear opaque except for a tiny clear area in the centre, represent another type of "flying saucer" inclusion. One of these can be observed on the perimeter of the dendritic, feathery mass in photomicrograph number 7. The tiny clear centre of this inclusion stays light as the polaroid analyser is rotated and, therefore, may represent glass which has filled the space where a bubble might have been trapped. Since the surrounding material within the flattened pseudo-hexagonal outline appears to go off and on as the polaroid analyser is rotated, this type of inclusion may also represent a mica platelet.

The large massive inclusions seem in photomicrographs numbers 7 and 8 at a magnification of 25 × probably may contain some pyroxene. Roedder and Weiblen speak of the silicate mass which they studied in olivines as having within it in all the larger and many of the smaller inclusions a feathery dendritic mass which they believed to be pyroxene but whose individual units were too small to study[(6)].

The study specimen showed many inclusions which took the form of a half slice of melon or what could also be described as similar to a lady's handbag. As seen in photomicrographic study number 9 at a magnification of 100 ×, the half melon slice is filled with black material separated by irregular clear veins and an opaque black crystal protrudes from the top of the slice. No identification has been made of this inclusion.

In peridots previously studied, the inclusion seen in the lower left hand corner of photomicrographic study number 10 has not been observed. At a magnification of 25 ×, this unidentified inclusion appears to have been "frozen in motion". Photomicrographic study number 11 may possibly represent two similar inclusions. The study was made at a magnification of 50 ×. When studied with polaroids, as the analyser was rotated, the black material within remained black and opaque; however, the clear material appeared to disappear. Again, no identification has been made.

Photomicrographic study number 12 again seems to represent an inclusion "frozen in motion" and it too remains unidentified.

The peridot study specimen proved to be a fruitful source of some interesting and unusual inclusions. The many "flying saucers" when studied with a microscope were revealed, at higher magnifications, possibly to include mica and olivine platelets. While the origin of this peridot cannot be definitely ascertained, it was purchased from a dealer in gemstones who buys peridots both from Arizona and Burma. Study of a large number of Arizona peridots does not reveal the same types of inclusions seen in the specimen stone. Therefore, it is believed that the peridot is from Burma, and this belief is reinforced by the fact that the stone is cushion-cut.

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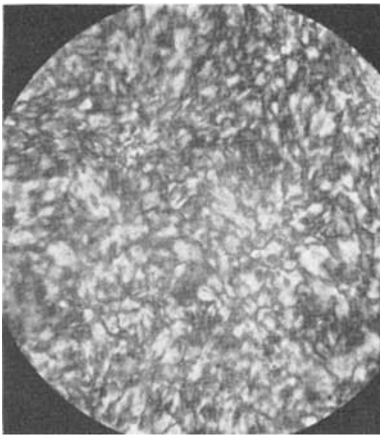
CHALCEDONY IN SURREY

By E. J. BURBAGE, F.G.A.

FOR the mineralogist, the Home Counties countryside is an area of somewhat restricted interest, and it would be idle to pretend that a "rockhound" can find much to concern him there. In consequence, one treasures especially the rare trouvaille, such as sherry-brown gem-quality barytes from the Fuller's Earth near Redhill, and shards of selenite from the same locality. At the other end of the same county, Gertrude Jekyll's "Old West Surrey" is, as MacDonald Davies comments, "that district of beautiful scenery and poor sections", and the paucity of good sections is matched by the dearth of minerals other than the ubiquitous quartz of the Lower Greensand. There, however, it is interesting to find that, on sectioning rocks from this locality, the silica content includes not only quartz grains but a variable amount of chalcedony. Very occasionally this can also be seen in the hand-specimen as a micro-botryoidal patina on the rock surface.

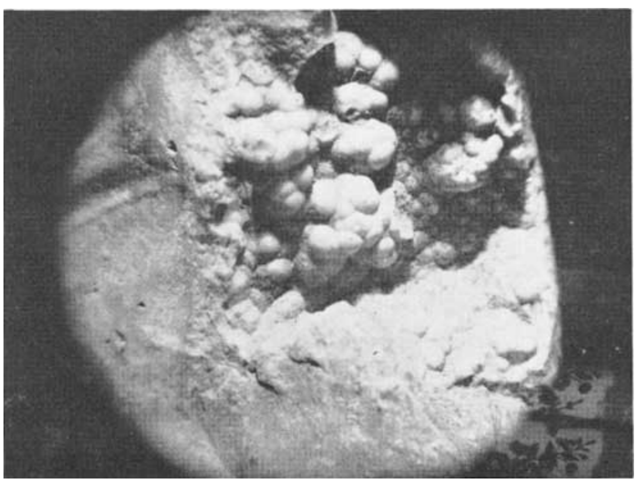
The chemistry and mechanics by which the silica in these West Surrey sandstones appears as chalcedony may well have been established by some earlier worker and have been described in "the literature", but not, it seems, in any recent and readily accessible publication, but one would guess at a secondary origin.

The Hythe Beds sandstone occurring in the wooded heathland areas south of Guildford have yielded many specimens, and as a collector's memorandum it is worth recording that fire-breaks have proved the most rewarding terrain, especially on those dull, wet days which provide optimum conditions of light to make the chalcedonic layers more evident. It is unfortunate that such lamellae, although often of reasonable areas, are usually very thin, and it is not too easy to section them for study, although Thorold Jones succeeded in so doing to aid the completion of a range of slides illustrating the sedimentary petrology of West Surrey. It would no doubt be possible for an amateur lapidary to trim the sandstone back to produce a chalcedony gemstone which might pass muster in these days when uncut and tumbled material finds acceptance in jewellery. From the West Surrey sandstone material it would be difficult to find chalcedony of sufficient depth to cut en cabochon or as a seal-stone, although in the amygdaloidal flints

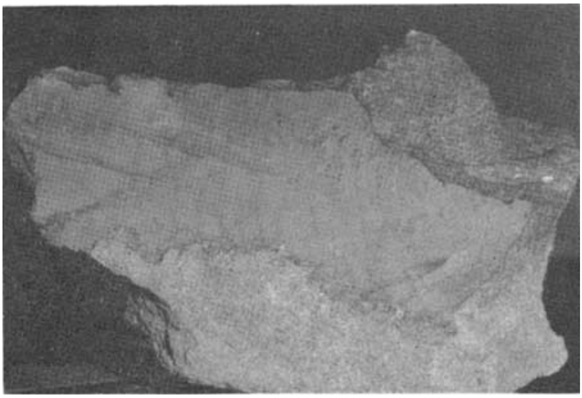


"Tabby extinction" of chalcedony from Surrey Hythe Beds.

Botryoidal surface of chalcedony patina surfacing Surrey Hythe Beds sandstone.



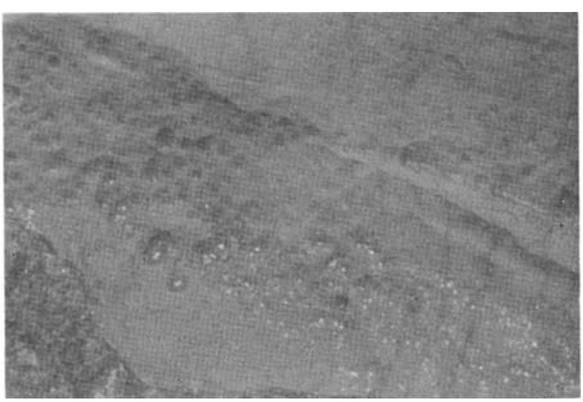
Chalcedony lining cavity in flint, Dorset.



Chalcedony on Hythe Beds sandstone from Surrey.

of the central chalk hills of Dorset material suitable for this purpose can occasionally be found.

Physical properties of this Surrey material seem on casual sampling in line with expected data. Its normal occurrence as a patina, somewhat awkward to separate, renders the determination of a precise S.G. difficult to achieve, but flotation in a bromoform-monobromonapthalene heavy liquid revealed approximate matching with a typical cut chalcedony (carnelian). There is some variation in translucency and colour, the latter, although usually



Botryoidal surface of chalcedony from Surrey Hythe Beds.

Fragment of Hythe Beds sandstone with thin chalcedony on surface (Surrey).

white, being occasionally a very pale opaline blue. In clearer specimens, thin flakes will transmit light sufficiently well to show "tabby extinction" between crossed polars.

Rather unexpectedly, the Hythe Beds sandstone which provided the specimens examined and which is virtually a monomineralic rock in this area, was found from a set of hydrostatic determinations to have a specific gravity much below that anticipated, ranging from 2·20 to 2·30. This would indicate "pore space" of the order of 15%, which one would not guess either from hand-specimens or microscopic sections. The very useful "Cosmos" handbook, Rudolf Börner's "Welcher Stein ist Das?" does however confirm a wide range in S.G^{s}. for an "einfache Quarz sandsteine" or "simple sandstone" of 2·00 to 2·65, as against 2·60 to 2·65 for quartzite. One could wish that the appropriate Geological Survey Memoirs were more informative on this score, their palaeontological and stratigraphical data being much more comprehensive than that on petrology, which receives somewhat meagre treatment.

Those familiar with the highly attractive countryside from which this material came will not require any additional incentives to visit it, and as the discovery of lacertas and sundews are adventitious rewards for summer explorations, so these odd patinated sandstone fragments provide an occasional unexpected interest for winter journeys. Thanks are due to Haslemere Museum for laboratory and library facilities in connexion with this and other enquiries.

Gemmological Abstracts

ANON. *Large diamond found in Louisiana.* Gems & Gemology, 13, 134, 1969.

An 18·20 carat diamond crystal, a modified octahedron, was found in Princeton, about 18 miles east of Sheveport. G.S.

ANON. *Russian synthetic gem diamonds made in 1967.* Australian Gemmologist, XI, 6, 19, 1972.

A report taken from the *Retail Jeweller* who quote "Diamant" that the Russians had made synthetic gem-quality diamonds in 1967, which is three years before the announcement by G.E.C. of America of their successful synthesis. R.W.

ANON. *Wrong to use Mohs to measure hardness?* Australian Gemmologist, XI, 6, 20-22, 1972 (reprinted from Canadian National Jeweller). 1 graph.

A general discussion on the value of Mohs' scale of hardness in which a number of individuals give their views. This can be summed up with the view that the scale is generally useful and sound, but the numbering of the scale induces in the lay mind the notion that some of the new diamond simulants approach diamond in hardness. R.W.

ARMSTRONG (R. D.). *A study of asterism in quartz.* Lapidary Journ., 25, 1108-1117, 1971, 12 figs.

The easiest method of orienting rough material is by locating the optic axis by a polariscope. The problem of the relative rarity of crystals of rose quartz is discussed: it is believed to be high-temperature quartz containing TiO_2 exsolved as rutile. R.A.H.

BANCROFT (P.). *The lure of Chivor.* Lapidary Journ., 25, 128-131, 1971, 12 coloured photos.

A description is given of a visit to the Chivor emerald mine NE of Bogota, Colombia, and of the open-pit mining methods used. R.A.H.

BANK (H.), OTTEMAN (J.), BERDESINSKI (W.), NUBER (B.). *Schleifwürdiger Childro-Eosphorit von Itinga.* Childro-eosphorite worthy of being polished. Zeitschr. d. deutsch. Gemmologischen Gesellschaft, 1972, 21, 1, pp. 1-3.

Some time ago H. Bank published an article describing a yellow-brown stone which was shown to be a childro-eosphorite, and was said to be of gem quality. In the meantime the source of this stone has been ascertained which was Itinga in the Minas Gerais in Brazil. The stone was carefully examined and various data as to its lattice structure are published. E.S.

BANK (H.). *Durchsichtiger farbloser Apophyllit von Poona.* Transparent colourless apophyllite from Poona, India. Zeitschr. d. deutsch. Gemmologischen Gesellschaft, 1972, 21, 1, pp. 4-6. Bibliography.

The apophyllite is a phyllosilicate and has the following chemical composition: $K\ Ca\ (F\ (Si_4O_{10})_2) \times 8\ H_2O$. It belongs to the tetragonal system. The name is derived from apo = away and phyllon = leaf as it peels easily when being polished. It is found in the Faroe Isles, Iceland, Central Germany and the specimen under discussion came from Poona in India. These stones are exceptionally clear and had a green colour. Because of its cleavage it is nearly impossible to facet the apophyllite which often shows characteristic light effects and a pearly sheen and is therefore sometimes known as ichthyophthalmite (= fish eye stone).

E.S.

BANK (H.). *Roter durchsichtiger Tugtupit aus Groenland.* Red transparent tugtupite from Greenland. Zeitschr. d. deutsch. Gemmologischen Gesellschaft, 1972, 21, 1, pp. 7-8. Bibliography.

In 1962 Sörensen described a new mineral which could be used for gem purposes and which he called tugtupite. It crystallizes in the tetragonal pseudo-cubic system. S.G. 2·36 but varying with impurities from 2·30–2·57. R.I. 1·496–1·502, double refraction 0·006. Up to now it has been located in the south of Greenland and on the peninsula Kola.

E.S.

BANK (H.). *Saphir-Dubletten.* Sapphire doublets. Zeitschr. d. deutsch. Gemmologischen Gesellschaft, 1972, 21, 1, pp. 53-54.

Short description of a sapphire doublet sent to the author from East Asia, the crown being natural sapphire and the pavilion synthetic sapphire. The contact layer was easily discernible once it had been recognized. It is of some interest that imitations of the above doublet were then introduced; these imitations had both upper and lower parts made of synthetic sapphire.

E.S.

BANK (H.). *Durchsichtiger gelblich-bräunlicher schleifwürdiger Eosphorit-* Zeits. d. deutschen Gemmologischen Gesell., 20, 125-126, 1971.

A transparent eosphorite/childrenite of gem quality, presumed to originate in Brazil, has α 1·645, γ 1·680; sp. gr. 3·08 (with inclusions); cell dimensions a 10·41, b 13·42, c 6·92 Å; H 4½.

E.H.C.R.

BOUSKA (V.). *Les moldavites.* Bulletin, Association Française de Gemmologie, 31, June 1972.

An account of the discovery of moldavites in Czechoslovakia with a map and photographs. Some specimens have been analysed chemically and found to contain up to 78% silica. M.O'D.

CROWNINGSHIELD (R.). *America's largest faceted emerald.* Lapidary Journ. 25, 40-42, 1971, 6 photos. (5 in colour).

A 59-carat emerald crystal is reported from the Rist mine, North Carolina. It has a colourless core with an exceptionally chrome-rich rim at least 12 mm thick; ε 1·580, ω 1·588; sp. gr. 2·73; it shows a reddish fluorescence under long UV light (3660 Å). From it a stone was cut weighing 13·14 carats; the only major flaw is a triangular tapering cavity. R.A.H.

CROWNINGSHIELD (R.). *Developments and highlights at G.I.A's lab. in New York.* Gems & Gemology, XIII and XIV. 11, 12, and 1, 344-353; 370-381; 8-13, 67 illus., 1971/2.

The first of these issues refers to the graining of diamond; burnt surfaces on rough diamonds and some unusual inclusions in diamonds. Comment is made on the stability of the cement used in constructing synthetic spinel/strontium titanate doublets and mention is made of the use of a coloured synthetic spinel crown in such doublets. A similar doublet with a synthetic white sapphire top is mentioned. Blue-dyed sapphires and a dyed chalcedony carving are spoken of. Also reported are synthetic red spinels; black-dyed oolitic opal and a biaxial yttrium aluminate of bright red colour. The second instalment gives a good discussion, illustrated with photomicrographs, of the effects of using holes drilled by laser beams to enable the decolouring of inclusions in diamond. Notes are given on some diamond inclusions; the surface appearance of a burned diamond; unusual girdling on a diamond; undue wear on a diamond and a diamond doublet. The new natural sapphire topped doublets with synthetic ruby and sapphire bases are reported upon. Unusual swirl-like inclusions in a natural sapphire and a tricky synthetic ruby are discussed. Two green coloured glasses and a case of suspected emeralds are fully reported upon. Pink diamonds whose colour is possibly due to treatment is another problem dealt with. The third issue discusses synthetic quartz in colours of blue, purple and green, and also a yellow-brown synthetic citrine. More is told of diamonds set "piggy-back"; non-fluorescent synthetic emeralds and a two-coloured diamond crystal and the new sapphire doublets are again referred to. R.W.

CALLAWAY (P. C.). *Doublets—a continuing factor in the gemstone market.* Australian Gemmologist, XI, 6, 15-17, 1972.

A good survey is given of the various types of doublets. The author keeps to the European tradition to call all composite stones doublets. A soudé type stone using two pieces of tourmaline seems a new development. The article has covered much ground in a small compass. R.W.

FANDER (H. W.). *Fluorite.* Australian Gemmologist. XI. 6, 25, 1972.

The report of an address given to the Federal Gemmological Conference held at Perth, Western Australia. A general description of the crystallography and properties is given. Something is told of the causes of the colours of the mineral, and its behaviour on heating and irradiation. The geological circumstances of its formation and the grades of commercial material used in industry are mentioned. R.W.

N. S. W. Opal Research Group. *The classification of black opal.* Australian Gemmologist, 11, 2, 24, 1971.

Oughton (J. H.). *Some thoughts on opal.* Ibid., 24-25.

Clayton (N.). *A basis for classification.* Ibid., 25-26.

Gemmological Association of Australia. *The G.A.A. definition of black opal.* Ibid., 26.

The term "black opal" is applied for colour only and does not refer to location of source. The term should be used exclusively for those types of solid natural opal consisting right through of opal in a dark grey, dark blue, or black base colour. The precious part of this black opal consists of the play of different colours inside the stone, right through the stone, or as a top layer of this stone, provided it is natural and mined in this way and the appearance has been enhanced only by cutting and polishing. R.A.H.

George (C. D.). *The birth of a pearl.* Lapidary Journ., 26, 474-485, 1972.

An account, illustrated in colour, of the investigation of the method of pearl manufacture by Pinctada maxima in the Exmouth Gulf area of Western Australia. M.O'D.

Gunn (C. B.). *A descriptive catalogue of the drift diamonds of the Great Lakes Region, North America.* Gems & Gemology, 12, 297-302, 333-334, 1968.

Forty-nine diamonds are described. G.S.

Harris (J. W.). *Black material on mineral inclusions and in internal fracture planes in diamond.* Contrib. Min. Petr., 35, 22-33, 1972, 12 figs.

X-ray, electron diffraction, and qualitative electron microprobe techniques have been used to study the black material observed on the surface of crystalline inclusions and adjacent fracture planes in diamonds from Sierra Leone, Ghana, and South Africa; several hundred diamonds were examined. This material was identified as graphite, pyrrhotite, and pentlandite. The possible origins of the black material are discussed. R.A.H.

JOHNSON (P. W.). *Common gems of San Diego County, California.* Gems & Gemology, 12, 358-371, 1968, 1 map, 13 photos.

Occurrences are described for beryl, spessartine, spodumene, topaz, and tourmaline. G.S.

LIDDICOAT (R. T.). *Developments and highlights at G.I.A's lab. in Los Angeles.* Gems & Gemology, XIII and XIV. 11, 12 and 1, 354-362; 382-387 and 18-28. 1971/2, 56 illus.

Discusses a green/pink grossular garnet in which the pink end proved to be hydrogrossular and the green end idocrase. A star beryl is mentioned and some disc-like beads which were probably a type of vegetable ivory are reported on. Mention is made of synthetic and natural emeralds of interest and also a report on a synthetic emerald said to be now made in Canada. A note on oolitic opal is given. Examination has been made on the new synthetic opal made by Gilson and a full report given on it. This showed that the stone had a refractive index of 1·44, a density of 2·02 to 2·08 and was found to have a hardness of $4\frac{1}{2}$ which is slightly lower than for natural opal; some differences were found in the synthetic opals behaviour to short-wave ultra-violet light. Other items discussed are a Pakistani diopside; treated black opal; wear in cultured pearls and comments on laser drilling. Types of serpentine; inclusions in glass; a peculiar aquamarine which showed brown oval blobs as inclusions, are other items mentioned. Notes are given on a new form of turquoise treatment, where white matrix areas had been altered to black, and the absorption spectra shown by a brown diamond and a green spinel. Angular inclusions in a Verneuil synthetic ruby are mentioned. R.W.

MCKAGUE (H. L.). *The serpentine mineral group.* Gems & Gemology, 12, 326-331, 1968.

A summary. G.S.

POUGH (F. H.). *Phenakite.* Lapidary Journal, vol. 4-12, 1972.

A large water-worn phenakite mass has recently been discovered in Ceylon. Resulting in a faceted stone of 568 carats, the original material was slightly cloudy and contained a scattering of rutile needles which, if more abundant, would have produced chatoyancy. The author summarizes the species and speculates on the possible occurrence of phenakite under conditions favouring the growth of beryl, since phenakite is a common associate of flux-grown and hydrothermal emerald. The author refutes a common textbook error which gives the colours of phenakite as colourless, yellow and pink. In the author's experience all phenakite is colourless and variations are probably due to local colouration on the surface by iron salts. The article concludes with a review of phenakite localities. M.O'D.

POUGH (F. H.). *Are you sure its topaz?* Australian Gemmologist. XI, 6, 17-19 (reprinted from Jewellers' Circular-Keystone). 1972.

When Dr. Pough writes the result is always "spicy" and interesting, and in this write-up on topaz he is no less so. The first part is mainly a discussion on the use of the name topaz and how it came about. The main part of the article deals with the two types, pegmatite and vein, and the mineralogy and locations of gem topaz. There is much of interest in the author's remarks on the behaviour of topaz under heat and radiation. R.W.

SZENBERG (M.). *The Israel diamond polishing industry.* Gems & Gemology, XIV, 1, 2-7, 1972.

An abridged version by the author of his 236-page study on The Economics of the Israel diamond industry. There is a historical survey and the growth of the Israeli diamond industry is given. The structure of the industry is discussed and something is told of the Government policies towards the industry. The article concludes with a survey of future prospects. R.W.

WEBSTER (R.). *The role of gemmology.* Medicine, Science, and the Law, 12, 1, 31-42, 1972, 16 figs.

The problems of identifying synthetic stones and simulants of the double and triple type are outlined briefly. For the routine identification of gemstones their examination by hand-lens, measurement of specific gravity and refractive index, and the study of their absorption spectra are described. The physical properties for diamond and eight common diamond simulants are tabulated. R.A.H.

Eulitz (W. R.). *Die rechnerische Ermittlung der optimalen Brillanz des Brillanten.* Zeitschr. d. deutsch. Gemmologischen Gesellschaft, 1972, 21, 1, pp. 13-43. Detailed bibliography, 16 graphs and diagrams.

The author defines the word "brilliance" mathematically, using the optical data to produce the correct mathematical formula. He first summarizes known results on this subject, describes the law of "brilliance" and its application to the diamond shape, explains the optical-symmetrical brilliant-cut and discusses the grade of brilliance and the limits of application to the brilliant-cut. As appendices he brings the linear proportions of an optical-symmetrical brilliant-cut and the relation between the diamond and the light intensity. After a very scientific exposition the author states as his opinion that, although it might be possible that sometimes in the future a better form could be developed for the diamond, for a long time to come the brilliant-cut is bound to survive.

E.S.

BOOK REVIEWS

Gems and Minerals of Rhodesia. The Rhodesian Gem and Mineral Society, Salisbury. 30 cents.

Details of the 1972 National Gem and Mineral Show, Salisbury.

S.P.

Crystals; symmetry in the mineral kingdom. Introduction by Vincenzo de Michele. Illustrated in colour. Orbis Books, London, 1972, pp. 80. £1·25.

Another of the well-illustrated books to emanate from the Istituto Geografico de Agostini, Novara, Italy, this brief guide to mineral crystals forms the best popular elementary guide to the subject so far seen. For the student of gemmology the illustrations of crystals approaching the ideal in form bring home the conceptions which are too often only to be found diagrammatically in textbooks and on this account are to be welcomed. They will also lead the gemmological student to pursue the study of minerals other than those used as gems—a tendency already noticeable.

The introduction of 15 pages deals with elementary crystallography and this section is illustrated by text figures, largely of the cubic system. Although a short introduction must necessarily omit some detail, the writer manages to include a section on Bravais lattices and Miller indices, lucidly described. The coloured illustrations are quite magnificent and particularly welcome are the descriptions of the crystal form accompanying each plate.

M.O'D.

RODEWALD (HANS J.). *Zur Genesis des Diamanten.* Verlag Meier & Cie, Schaffhausen, Switzerland, 1960, pp. 69. Sw. Fr. 8·60.

This interesting short monograph is divided into four sections. The first deals with the origin of diamond within the kimberlite pipe and illustrates by means of text diagrams various existing pipes, giving also tables of yield, an account of the chemical processes obtaining at the time of diamond formation, and a short bibliography. The second section reviews the work of Moissan and Prandtl and the third that of Hannay. This section contains diagrams of the apparatus used and of other contemporary and present-day apparatus used for the manufacture of synthetic diamond. The last section illustrates the relationship between colourless and red phosphorus, a relationship analagous to that between diamond and graphite. These sections also contain short bibliographies.

M.O'D.

BRØDSGAARD (K.). *Laer smykkestenene at kende.* Series Berlingske Fritids bøger. Berlingske Forlag, Copenhagen, 1970, pp. 128. Illustrated in black-and-white and in colour. 16Kr.50.

A popular introduction to gemmology forming part of a series covering various useful arts. This book is especially successful in its freehand text illustrations which depict crystal form; inclusion of stones in heavy liquids is worth paragraphs of description. A larger representation of the refractometer scale would be desirable. The colour plates are of good quality. Tugtupite should have been found a place in a Danish book.

M.O'D.

CHASE (S. H.). *Diamonds.* Franklin Watts, London, 1972, pp. 90. Illustrated in black-and-white. 80p.

A popular book consisting largely of illustrations. The author deals with the early diamond discoveries in India and celebrated diamonds from that continent and then turns to South Africa which is similarly though more exhaustively treated. The shots of diamond recovery are good and the later chapters on the fashioning and use of both gem and industrial diamond are also well illustrated. There are some interesting anecdotes about recent discoveries of large diamonds and the book ends with a short glossary.

M.O'D.

HARTIG (H.). *Edelsteine und Mineralien selbst schleifen* (2nd edition). Verlag Frech, Stuttgart, 1969, pp. 64. Illustrated in black-and-white. DM7·60.

A small but well-produced book introducing faceting to the amateur. The nature of gem materials and their correct orientation for cutting purposes are simply explained, and these opening sections are followed by details of modern faceting equipment, with particular emphasis on the mechanical dops for which tables of appropriate angles are given. A feature of the glossary of gem materials which completes the book is the provision of dispersion figures for the majority of the listed species.

M.O'D.

JUBELT (R.) and SCHREITER (P.). *Gesteinsbestimmungsbuch.* Deutscher Verlag für Grundstoffindustrie, Leipzig, 1972, pp. 178. Illustrated in black-and-white and in colour. Separate folding tables. DM16·80.

Written, according to the foreword, for the benefit of friends of geology, mineralogy and geography, this useful book presents geological and mineralogical data in a form designed for those wishing to study specimens in the field without a background of mineralogical training. A short introduction precedes a description of rocks with East German locations and comprehensive chemical information; particularly welcome are diagrams showing the interrelationship of rock-forming minerals. A section of coloured plates depicts typical rock formations and includes illustrations of thin rock sections which are also shown in black-and-white together with some rock specimens. There is a short bibliography. Separate folding tables cover the rock-forming minerals in traditional order giving constants, and maps. M.O'D.

ASSOCIATION NOTICES

FORTHCOMING MEETINGS

A reunion of members will be held at Goldsmiths' Hall, Foster Lane, London, E.C.2 on Monday, 27th November, 1972, at 6 p.m. This will be followed at 7 p.m. by the Presentation of Awards gained in the 1972 Gemmological Examinations. The newly elected President of the Association, Dr. G. F. Claringbull, B.Sc., Ph.D., has kindly consented to present the awards.

On Monday, 29th January, 1973, at Goldsmiths' Hall, at 7 p.m. Mr. B. W. Anderson will give a talk about his experiences as Director of the Gem Testing Laboratory of the Diamond, Pearl and Precious Stone Trade Section of the London Chamber of Commerce from 1925 to 1972.

Also at Goldsmiths' Hall, on Tuesday, 17th April, 1973, at 7 p.m., Mr. Julius Petsch Jnr. of Idar-Oberstein, will give an illustrated talk to members on new discoveries of gemstones.

GIFTS TO THE ASSOCIATION

The Council of the Association is indebted to the following for gifts to the Sir James Walton Library:

Dr. W. Campbell-Smith, Sevenoaks, Kent, for backnumbers of the *Journal of Gemmology*.

OBITUARIES

We regret to record the death of M. Georges Gobel, one of the very few chosen to be Honorary Fellows of the Gemmological Association, who died in Paris on 24th July at the age of 87.

After early pioneer work on pearl testing in a private capacity, M. Gobel was asked to form and direct an official pearl-testing Laboratory under the aegis of the Chambre Syndicale des Negociants en Diamants, Perles fines et Pierres Precieuses, and by April 1930 this was firmly established, and he enlisted the services of two trusted assistants, Mme. Grossmann and Mlle. D. Level. The work of the Laboratory was soon extended to include gem-testing, and it was taken over by the Chambre de Commerce de Paris. It was thus closely parallel to the Precious Stone Laboratory of the London Chamber of Commerce, and between the two a close and valuable liaison was soon established.

Some years later M. Gobel assumed a dual role when he was appointed Inspector for the Repression of Frauds under the Ministry of Agriculture—a post which gave him powers to put into effect his strongly-held views on fair dealing in the jewellery trade.

During the war (1941) his work was further extended when he was asked to conduct Trade classes in gemmology. His lectures were original and based on fundamental theory, but were strongly reinforced on the practical side by Mlle. D. Level during evening classes held in the Laboratory.

So much for the domestic side of his work: amongst the still surviving senior gemmologists of Europe he will chiefly be remembered as an outstanding representative, for more than 30 years, of the French point of view at international gatherings such as the rather grandiose affairs organised by B.I.B.O.A. or the more intimate International Conferences of Gemmologists held since the war.

On such occasions his eloquence was outstanding: his love for fine jewels was clear in his every utterance, and his face was set sternly against all forms of fraud. He could summon a diamond from thin air and place it in the palm of his hand, glittering for all to see. He spoke of a brilliant-cut diamond as "a violin that plays with light", of a ruby as "attracting our glance as does a rose in the deep core of its petals", of a topaz "its very flesh is made of light"—phrases which, in the French tongue which he spoke so superbly, sounded far more impressive than in these lame translations.

Gobel's private life and private thoughts were guarded by an impenetrable reserve, but he was a loyal and warm friend to those fortunate enough to win his trust, and amongst such will always be remembered with admiration and affection.

Mr. John Stanley Harper, Birmingham, who was associated with a well-known firm of Birmingham jewellers for 25 years has died after a long illness. He was 57 and obtained the Fellowship Diploma in 1954.

For 20 years Mr. Harper lectured to students at the Birmingham School of Jewellery and Silversmithing on gemstones.

TIES FOR FELLOWS

An Association tie is available for Fellows. The tie, which is dark blue, bears the crest of the Association in golden yellow.

The price including postage (U.K. only) is £1·25 each. Overseas postage is 10p extra for surface mail, or 40p for air mail.

MEMBERSHIP

MacLeod, Helen L., Washington D. C., U.S.A., D.1971, transferred to Fellowship.

In the list of ordinary members elected at the meeting of the Council held on the 17th May, published in the July issue of the *Journal*, the following names were spelt incorrectly: Elisabeth Lipschitz-Wachsberg was listed as Elisabeth Oipschitz-Wachsberg, and Lloyd C. Melancon as Lloyd C. Melacon.

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