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and

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ASSOCIATION
OF GREAT BRITAIN

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OF GREAT BRITAIN
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NEGATIVE CRYSTALS IN RUBY FROM BURMA

By PROFESSOR DR W. F. EPPLER

NEGATIVE crystals are not seldom mistaken for solid inclusions, particularly if they exhibit crystal faces of the same kind as those of a real crystal. In corundum, notably in ruby, the planes of negative crystals often show numerous steps, as can be seen in Fig. 1. They result from the alternating development of the base plane and the pyramid faces respectively. They are identical with the steps on the outside of ruby crystals, as may be seen in Fig. 2. Here, some of the edges or steps are roughened, due to the abrading of the crystals during their transport to the secondary deposits.

In other cases, the negative crystals show flat faces combined with rounded forms, significant of naturally rolled material. A convincing example is presented in Fig. 3. Sometimes, the cavities have well defined corners, edges and planes, the latter showing irregularities which are quite common with natural crystal faces (Fig. 4).

Flat forms of negative crystals also can be observed and two of them are shown in Fig. 5. They are reminiscent of waterworn crystals. The inclusion on the left side of the picture shows numerous "steps" as already mentioned above. The background of the

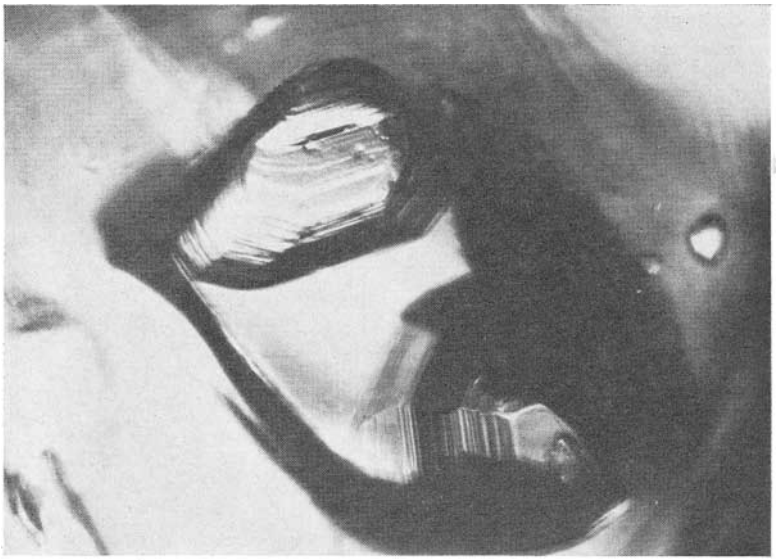

FIG. 1. A negative crystal in ruby with two elevations and numerous "steps" on its sides. 118 ×

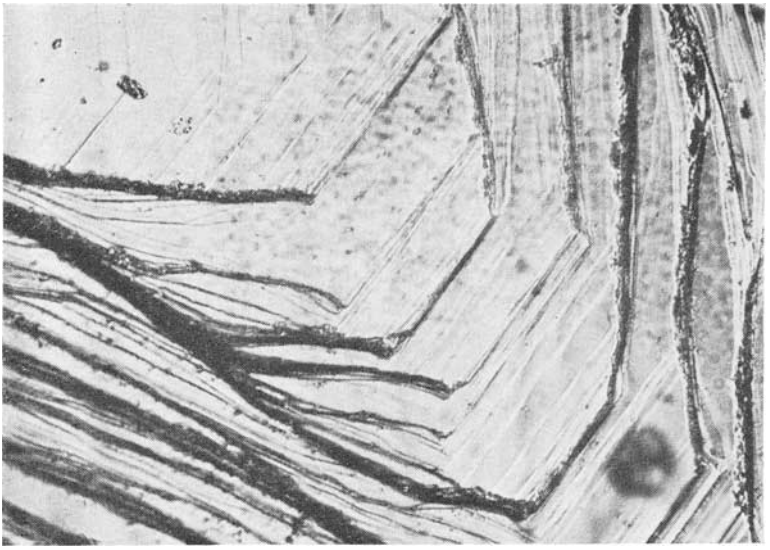

FIG. 2. Steps on the outside of a ruby crystal from Burma. 118 ×

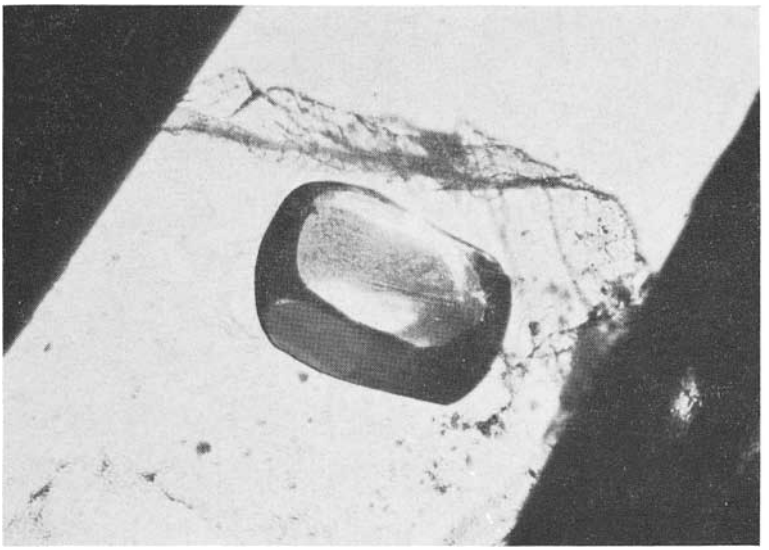

FIG. 3. Ruby from Burma with a rounded negative crystal showing also flat crystal faces; combined reflected and transmitted light. 62 ×

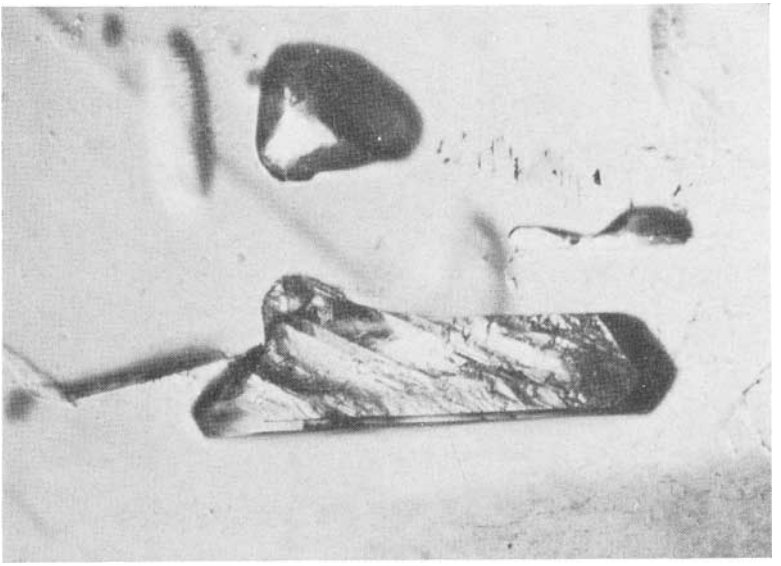

FIG. 4. An elongated negative crystal in a Burma ruby. Above, a doubly refractive crystal with a refractive index lower than 1·764. 118 ×

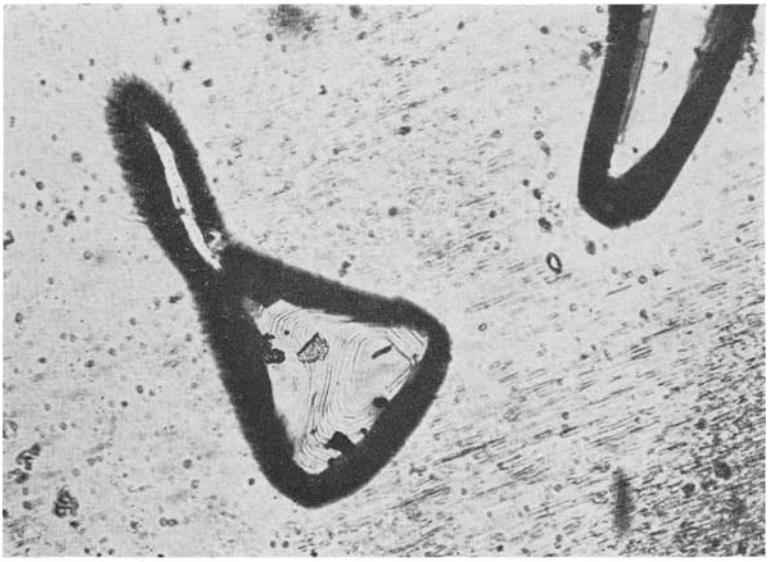

FIG. 5. A Burma ruby with two flat negative crystals, one of them showing fine steps. 118 ×

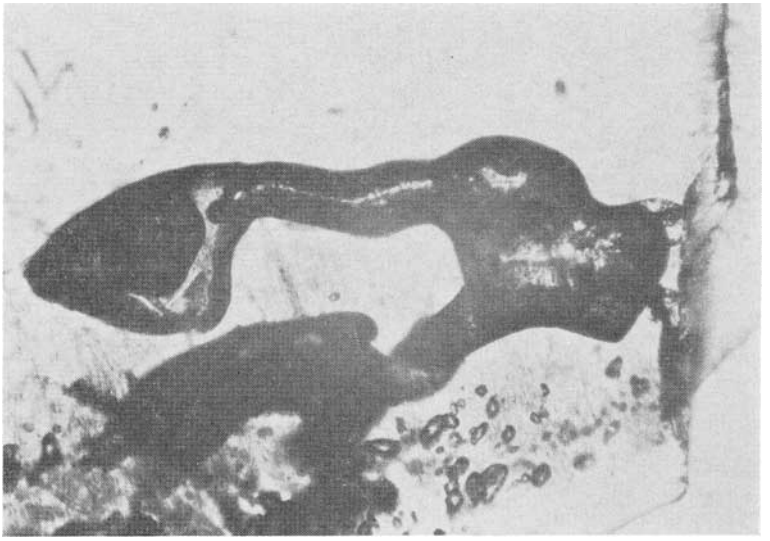

FIG. 6. A Burma ruby with a great cavity. 62 ×

picture, particularly on the right side, reveals needles of rutile, the orientation of which indicates that these negative crystals are situated parallel to a plane of the second order prism. Besides this, a facet has opened the negative crystal and a few particles of dust have been deposited. They can be recognized by their irregular forms. They also demonstrate that this negative crystal is really grown as an empty cavity.

Fig. 6 exhibits a strange inclusion in a ruby from Burma. It is a great cavity with two elongated arms. In reflected light, some crystal faces can be observed. This formation is about 1·4 mm long and can be seen with the naked eye.

The origin of these hollow spaces is not easy to explain. It may be possible that the growing ruby had to undergo a disturbance of its surface tension, which could be due, for example, to local differences in temperature or to some other cause. In any case, an obstacle for the growth front was present which partially stopped the growth of the crystal and caused these multiformed cavities with more or less well developed crystal faces.

The negative crystals are not totally empty, but they contain gases among which hydrogen sulphide must be present in a predominant amount. It could be recognized by its characteristic smell when the stones were crushed and the gas-filled cavities thus opened. There exists here a similarity to the newly found "vanadium-garnet", which, according to E. Gübelin and M. Weibel (1975),* also contains perceptible quantities of this particular gas. It is also most probable that during the growth of the ruby the gas was already present in the form of bubbles and that these "obstacles" have been another cause for the origin of the negative crystals.

*Lapidary Journal, 1975, 29, 2, 406.—Ed.

NOTES FROM THE LABORATORY

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

The Gem Testing Laboratory, London Chamber of Commerce and Industry.

FIGURES arrived at recently during a test on a suspect amber/casein necklace were rather amusing. They reminded me forcibly of attempts seen sometimes in examination papers, where the result is guessed accurately and the characteristics made to fit, hoping the examiner would not notice! A similarity of numbers caught my eye (figuratively speaking) and having a penchant for word-play I wondered whether they were worth noting. These figures were taken from carbon copies and have *not* been adjusted. Normally when carrying out tests on amber-like products we use a large container of salt solution, such that amber is readily floated away from its near neighbours, except copal resin. A touch of ether will reveal tackiness of copal resin: other subtle tests are used for casein, etc. However, in this case the necklace was of large beads very tightly strung, so that it was too stiff to coil and immerse in our salt solution. We had therefore to resort to useful practical weighing in air and then in water and to divide the loss in weight into the weight in air to arrive at a relative density. The weight in air was 108 grammes and weight in water was 8 grammes, thus a loss in weight of 100, which when divided into weight in air showed an exact figure for amber as follows:

$$108 - 8 = 100 \qquad 108 \div 100 = 1{\cdot}08$$

* * *

A necklace of spherical, deep green, subtranslucent, mottled beads was a recent test. Williamsite, a green form of serpentine, had been mooted and almost accepted as the result, since chromium had been detected in the spectrum, albeit weakly. Black octahedral inclusions, which williamsite has, plus a poor distant-vision reading of 1·57, *seemed* to clinch matters. At each drill-hole white powdery deposits seemed to indicate softness of abraded material, caused by close contact rubbing as the beads were not knotted. However, having been taught to accept facts which seem to fit, though loosely, and in fact never having seen such a fine colour of Williamsite cut specifically into a graduated necklace, I decided to unstring and take a density. I was pleased to get a good density figure for nephrite. Nephrite too has black octahedra and weak chromium

spectra. The apparent abrasion was not rubbing traces, as imagined, since the drill-hole edges were sharp—the powder was probably drilling-residue worked out by the stringing or polishing-powder incompletely washed away. The distant-vision reading was due to a poorish surface on the beads. The result—nephrite instead of williamsite—was, I believe, due to experience plus gemmology!

* * *

Among a parcel of jewellery sent in for test was a finely carved grey cameo in an antique mount. The owner, one of our more erudite and gemmologically-aware members, takes pride, when sending his goods for testing, in having them accurately described on his order note. He had requested "please test agate cameo", and, since it was beautifully carved, it presented a little difficulty in regard to a test. Close examination with a lens gave information of structure *not* that of agate. A simple test for a carbonate reaction, discreetly carried out, proved positive. It was in fact a very fine shell carving and still looked like agate.

* * *

Every now and then we are presented with a pink-red stone to decide: Is it pink sapphire or pale ruby? Although one can often arrive at a conclusion by simply asking several people to describe the colour of the stone and taking the majority verdict as visual evidence, it still presents a problem. When corundum is of such a colour as to be on the border-line between deep pink/red and pale red/pink, no harm can be done by allowing either name to be employed. Contrary to the usual request—from someone who has a pink sapphire which *is* pink and wants a ruby certificate—we had the other day the unusual. A customer with a definite ruby asked us to condemn it (his words) as pink sapphire, which of course we could not.

* * *

A very fine intaglio carved pendant of soft rich yellow transparent material presented a problem recently. A good distant-vision reading indicated opal, but our customer didn't think it could be, such was the quality of the carving. The pendant looked like a mid-nineteenth century piece, and it would have been sacrilege to cut through the very fine gold mount, which fully enclosed the edge and prohibited much of a view. Examination over a white matt reflecting surface with a 10 × lens showed natural features not in themselves diagnostic. To our relief and pleasure it was found by

the jeweller that the stone could in fact be lifted out bodily, due to the exquisite nature of the workmanship leaving a very firmly flush-fitting band of metal which allowed the stone to be extracted. We had moved warily in the matter, since our methods are non-destructive and the material, which was probably opal, was frangible to say the least. A matching density liquid with known S.G. comparison stone established the stone to be opal.

* * *

Another opal, which caused me a lot of trouble customerwise, not gemmologically, was a black opal purchased as such, mounted in a ring and offered for sale. All of the jeweller's customers condemned it as a doublet, due to a fairly straight band of potch running parallel to the girdle of the stone. Using a flexible light-source, I followed the potch around the stone and found the opal colour lipped slightly into the potch and again where potch merged into opal colour. This made it impossible to be a doublet. Our provincial member still had difficulty in accepting our findings. However by calling in a consultant we finally read the lesson and doubled our charges.

* * *

A parcel of 25 grossular garnets recently submitted for our interest varied in colour from colourless to pale yellow to brown and cinnamon, from pale light green to very deep green. The refractive index measurement ranged from 1·739 to 1·750, and there were various reactions under x-ray, long-wave and short-wave ultra-violet light stimulation. The first seventeen stones were marked from Laletema, Tanzania, and the second two batches from Kenya, from Bridges Mine and Morgans Mine, C. R. Bridges and P. R. Morgan being geologists. The absorption spectra seen in some of the green grossulars did not seem to be chromium, but possibly vanadium, and on the blue end of the spectrum were vague lines or indications of what could be manganese bands as seen in spessartite garnets. All 25 stones were fairly small—some very small—and all were loaned by E. F. W. Wolff, of 1 Hatton Garden. The tabulation (see page 9) gives a better idea of colours and reaction under filter, x-ray and U.V. light than does a worded article.

One other very fine garnet also sent in for our information (and pleasure) was a beautiful oval faceted deep yellow grossular garnet weighing 13·89 ct. The stone had a refractive index of 1·738 and a

No.	*Colour*	*R.I.*	*C.C.F.*	*X-ray*	*S.W.*	*L.W.*	*ABSP.*	*Province*
1.	Colourless	1·7395	Inert	Bright Apricot	Bright Yellow	Deep Apricot	—	Lalatema,
2.	Pale Yellow	1·740	,,	Apricot	Dull Apricot	Apricot	—	Tanzania
3.	,, ,,	1·7405	,,	,,	,, ,,	Pale Brown	MN ?	,,
4.	Yellow Brown	1·7415	P. Yellow	,,	Deep Brown/Red	Inert	,, ?	,,
5.	Golden Yellow	1·7415	,,	,,	,, ,,	,,	,, ?	,,
6.	,, ,,	1·742	,,	Apr./Yellow	,, ,,	,,	Hint MN	,,
7.	Cinnamon	1·746	Brown	Deep Yellow	,, ,,	,,	MN ?	,,
8.	Brown	1·750	,,	Inert	,, ,,	,,	—	,,
9.	Lime Green	1·740	Light Green	Bright Apricot	Dull Yellow	Feeble Brown	—	,,
10.	Yellow Green	1·7405	Yellow Green	Apricot	,, ,,	Inert	—	,,
11.	Light Emerald	1·740	Near C/less	V. Bright Apricot	Bright Yellow	Apricot	—	Lalatema,
12.	,, ,,	1·740	,, ,,	,,	Apricot	Dull Apricot	Hint VA	Tanzania
13.	,, ,,	1·740	,, ,,	Apricot	,,	Light Apricot	Hint MN	,,
14.	,, ,,	1·740	,, ,,	V. Bright Apricot	V. Bright Yellow	Apricot	—	,,
15.	Light Tourm. Green	1·740	Light Pink	Apricot	Dull Apricot	Poor Apricot	Hint MN	,,
16.	Bright Green	1·740	V. Pale Pink	Dull Apricot	Brown Apricot	Inert	—	,,
17.	,, ,,	1·7405	Pale Pink	V. Poor Dull Apricot	Inert	Dull Green	Hint MN	,,
18.	Emerald Green	1·7405	Pink	Apricot	Deep Apricot	Inert	—	Teita Province
19.	,, ,,	1·741	,,	V. Pale Yellow	Inert	,,	—	Bridges Mine
20.	Grossular Green	1·741	Light Pink	Apricot	V. Deep Apricot	,,	—	Kenya
21.	Deep Gross. Green	1·740	Pink	V. Dull Yellow	Inert	,,	—	
22.	Deep Green	1·742	Pink/Red	Inert	,,	,,	VA & MN ?	Teita Province
23.	V. Deep Green	1·742	Brown/Red	,,	,,	,,	,, ,,	Morgans Mine
24.	,, ,,	1·749	,, ,,	,,	,,	,,	,, ,,	Kenya
25.	,, ,,	1·750	,, ,,	,,	,,	,,	,, ,,	

MN ? = Hint of band in blue indistinct
VA = Hint in red of obscure band not chromium
VA & MN = Vanadium and Manganese?

specific gravity of 3·625: it fluoresced with an apricot fluorescence under x-ray excitation, a duller hue under S.W. U.V. and an even deeper tone under L.W. U.V. Considering the well known isomorphous character of garnets, one wonders what new varieties lie in store for us?

It is interesting to note from the list that the stone with the least colour behaved or reacted most strongly under excitation, and as body colour increased and refractive index ascended the reactions were slightly inhibited. One wonders whether the optimum amount of manganese and/or vanadium causes beauty of colour in like manner as a trace of chromium affects the colour of Burma rubies?

* * *

Among the variety of tests carried out in the laboratory are those on large and unusual pearls. One tends to miss the obvious in "Notes from the Laboratory". Although we write most frequently upon the stones and jewellery we see and abstracts published are on every possible aspect of jewellery, pearls do not receive the attention they deserve. Obviously—as I have stressed in one or two talks—gemmologists usually have a 10 × loupe, possibly a refractometer or spectroscope at their disposal, but seldom an x-ray set! Since the laboratory was founded to test pearls (and coloured stones came second) it seems only reasonable in this our fiftieth year to give pride of place to *pearls*. Like all precious gems they have their imitators, cultivators and propagators. The basic theme of a large mother-of-pearl bead and a very thin skin of nacre is well understood. The diagrams so expressively drawn of cross sections of cultured pearls, the endoscope needle, the radiographs and lauegrams—all excellent examples, chosen especially to portray how to test pearls—make laboratory procedure appear simple. Probably the simplest test of all is an obvious poor-quality Jap pearl necklace. This photographs well and leaves no doubt in the mind or eye of the radiographer. Natural pearls of very fine quality strung as a necklace do not in general show sharply demarcated structures. The finer the pearl growth, the less one sees, if x-ray techniques are used.

The really difficult one is a large rounded slightly baroque pearl in a ring. One such pearl gave us considerable trouble recently. On first sight the pearl looked natural, being a rounded button shape: its colour was not too good: and for these reasons we hoped for a

radiograph to show, as they usually do, several overlapping concentric arcs of structure. Unfortunately, such lines were seen *plus* the very faintest of suggestions—dead centre—of a spherical nature, not strong and slightly evanescent, with no typical conchiolin gap, no fluorescence, no phosphorescence. Opinions varied upon the interpretation of apparently fine structure so faint in the centre as to leave one thinking "Did I see it or is it imagination?"—such conditions do occur if one looks too long and too hard. Fortunately for us our customer was a gemmological enthusiast. Most of our customers are commercially concerned and in a hurry typical of Hatton Garden, wanting the results yesterday or at latest today! After several unhappy radiographs we decided to resort to lauegrams. These did clinch the result, but only after several shots. It was obvious towards the end that the "pearl", which was 109·28 grains, was at least 80 grains natural exterior and 20 grains mother-of-pearl bead nucleus. This of course gave a rounded hexagonal structure with undertones of four spots merging into the six-fold pattern. Not a piece of cake—not as per textbook. Most tests which finally arrive at our door, apart from mechanical or mundane valuation tests, are those which are difficult. The customer in this case was interested since an earlier valuation had been as of an *imitation pearl*—and what an imitation!

Another and far larger undrilled pearl of a round button shape also gave some trouble. This pearl was of a very fine interesting creamy colour and weighed 134·16 grains. We had poor success at first, using exposures of 25 minutes to try to get sufficient strength of structure revealed. Finally we ordered some *new* film and found the results were excellent as they should be. Doubtless we shall keep an eye on film stock and ensure rotation of stock turn-over. We use at least six types of film of varying speeds for radiography and lauegrams.

* * *

Among other stones tested, remarkable for their range in value and/or interest, we have had recently a very large alexandrite indeed, a small glass bead from a thirteenth century collection, pink marble beads looking like coral, a large star-diopside of magnetic attraction, a bracelet of williamsite-like green stones which weren't, and a specimen of "cultured amber", which is not.

The alexandrite was a very fair example of its type and weighed just over 40 ct. The glass bead was sent in for its antiquity and

interest alone. It was very coarsely made, had a very large drill-hole, and the swirl-striae were concentric about the drill-hole. It sank in methylene iodide, but the gas bubbles so easily seen should have floated it. Whilst no great problem and of no great merit, it was interesting to see something so very obviously hand-made so long ago—one could weave tales to fit about its wearer. Gemmology in a laboratory, though, does not permit of flights of fancy: science and facts keep us down to earth. The star-diopside was not physically attractive in appearance, but, as has been reported earlier by R. Webster and D. G. Kent,* they do react to a magnet; that is to say, a star-diopside—placed, polished cabochon surface down, on a clean glass slide—will react to the pull exerted by a pocket magnet. Just for the fun of it we reversed the order. We spun the diopside briskly and used a magnet to brake its speed of spinning. The pink baroque opaque beads were a pleasant colour but had a saccharoidal to granular structure totally divorced from coral structure. A strong reaction to acid proved the probable calcium carbonate nature, backed up by a density of the whole necklace in the region of 2·69–2·70.

The bracelet of nine oval translucent/transparent pale green cabochons was very attractive. Examination showed decided octahedra and cubic black inclusions as seen in williamsite (serpentine). The quality of polish and surface lustre seemed too good for a serpentine, however, and a distant-vision showed a good reading, just above 1·70. Final confirmation that they were grossular garnets came from the yellow fluorescence under x-ray excitation. From Harry Wheeler we received our piece of "cultured amber". This was ostensibly a cigarette-holder on which, being broken, we were permitted to use methods not usually employed. Normally all testing is of a non-destructive nature—our customers seem to regard this as essential! The golden amber-coloured holder had crowded, squeezed and whorl-like structures reminiscent of pressed amber but markedly more so. The specimen had a density of 1·239 and a refractive index, quite sharp for this material, at 1·56. We took a scraping and heated it in a test tube. It melted fairly readily, and the fumes, which had a very itchy, fatty smell, left a condensed brownish yellow sticky liquid to congeal plus quite attractive radiating crystals which formed as a "frosting" on the test tube walls. Using R. Webster's *Gems* (third edition) we carried out his test for

*J. Gemm., 1973 XIII 8,308.—Ed.

an alkyd resin. This test is described under turquoise impregnation.† The chemical test carried out by my colleague, Alan Clewlow, B.Sc., F.G.A., proved conclusively that an alkyd resin was present. The radiating crystals of phthalic anhydride were proved by addition of resorcinol and adding concentrated sulphuric acid (H_2SO_4) and warming the solution. The addition of sodium hydroxide produced a yellow solution, which gave a very strong fluorescent glow under long-wave ultra-violet excitation.

Alkyd resins, formerly termed glyptal resins, are a condensation product derived from glycerol and phthalic anhydride. The term covers dyallic esters used as resin binders in alkyd moulding materials. Needless to say the term "cultured amber" can now be safely dropped by the firm marketing this product.

* * *

The job of a laboratory trade gemmologist is an interesting occupation—we seldom see the same thing twice and feel constantly the challenge or possibility of something new, unusual or demanding. I enjoy the job very much even though at times things get a bit hectic.

The careful wording of reports or certificates, using words or phrases which cannot be misinterpreted and are not in themselves ambiguous, tends to the consideration of and correct use of words. Nomenclature, terminology, trade terms and phrases, all have an aspect and bearing such that, apart from giving or putting a label upon a stone, the very use of certain phrases is itself indicative of a person. Certain trade phrases give a clue to a person's age and/or experience. If a customer calls at the Laboratory for a test and asks conversationally of his stone "Is it Brazilian?" I know he means "Is it a sherry-colour topaz from Brazil?" Again, if a customer, speaking of his diamond, says, "Is it a three grainer?" I know he is a little long in the tooth and means "Is it a three-quarters of a carat stone?" Similarly, if he talks in grains and the "once" of a pearl, he is fairly experienced in the trade and not one of the younger merchants. But not all terms are indicative of age: well-known phrases, such as "a them there" or "plonk testing", are the products of the literate world of B. W. Anderson and the late Dr Ernest Rutland—both eminent gemmologists who have coined words and phrases which have found their niche in our world of gemmology.

A fairly recent new word would have caused them some

†op.cit. pp. 217 sq.—Ed.

hilarity and with their crossword-clue training might have afforded them a little gemmological exercise. A customer called and was tended at the door by one of my colleagues. The conversation seemed to be upon whether or not he was a member of ours or an affiliated trade association and so entitled to use the Laboratory facilities. He gave the name of ARABELLA, which to me was proof enough of his non-membership, since we know most of our firms by memory. I told him we had no member firm of that name. "That is not the name of a firm," he replied, "it is the name of this stone." Intrigued by 'Arabella' and what it might portend, I asked, "What stone?" "This one," he replied, producing a bar brooch with an obvious quartz cat's-eye in a border cluster surround. Then the psychological penny dropped—"Do you mean, is it a CHRYSOBERYL?" I asked. "That is right", he brightly responded, "Arabella or Chrysoberyl, that sounds like it!"

A modern tendency is "name-dropping": whether or not this was gemmological probing for a clue, it served no useful purpose, apart from inducing a mental note on the use of speech therapy. We duly accepted the test in all commercial seriousness and found it to be neither Chrysoberyl nor Arabella and duly reported upon it unambiguously as a *Quartz* cat's-eye. Other aspects of the misuse of words or even misspelling can be cited without trying to be superior. Doubtless the examiners when checking exam papers come across many such instances. I think, though, that in our own trade, whether wholesale dealer, retail, etc., we should spell the names of well-known gemstones correctly. Literally (or illiterally) not a stone's throw from our Laboratory one can read such 'gems' as "ametheist" and "saphire". I do not say the following was written by a West End shop manager, but it *did* come from a West End address. A stone in a ring was carved in intaglio style and we had to determine the nature of the stone: the note enclosed, with instructions from the West End address, said "Please test Englio ring". One can assume that a messenger perhaps was asked to make out an order to "test intaglio in ring," and being a little hard of hearing did not get the message! Thus, not liking to ask for the details to be repeated, he allowed this peculiar word to find its way into the journals of the trade.

* * *

When calling, some of our more vociferous customers (not necessarily all gemmologists) ask breezily "What is new?" as if we

are constantly turning up new gemstones but probably really want to know only what is new in synthetics or what to look out for. Certainly our routine testing is concerned primarily with the better-known gemstones used in jewellery, and, when an apparently normal stone does not quite respond to routine checks or where there is an anomaly, this is the juncture at which laboratory gemmology swings into action. No deviation, no slight differing from basic characteristics, no anomaly in fact should be allowed to escape full investigation until a satisfactory result or reason is found or afforded for the difference. *Vive la différence* has subtle innuendoes! Sometimes, when routine is disturbed by unusual occurrences, or when pressure builds up for a result to be found for an important item for an impatient customer needing our report to enable a purchase "subject to test" to be completed, then life in the laboratory becomes a bit hectic. I used the same phrase earlier in these notes, mentioning that I enjoy the job although things sometimes become a bit hectic—well, here we have yet another example of the use of words and their meaning. Hectic is often used to describe events which become tremendously busy or involved, and for myself I always used to associate "hectic" with "frantic", which is probably a more suitable word. Hectic is defined in Chambers Twentieth Century dictionary as: "Pertaining to the constitution or habit of body". One can see the link between a flushed hectic fever and "feverish". It took gemmology in the laboratory plus etymological guidance from B. W. Anderson for me to realise early on the frequent misuse of words—not exactly malapropisms, but close relatives.

* * *

Anomalies or even nuances of difference can cause quite a lot of bother gemmologically. One such case recently covered a routine test on an amber cigarette-holder. The item in question satisfied all the requirements for natural amber, S.G., R.I., frangibility, inert to ether, blue patch on freshly scraped surface when viewed under short-wave ultra-violet light, *no* signs of reconstruction by pressure, burning evenly with aromatic smell (we had permission to destroy), even the inclusions satisfied me; the exception being not so much an exception as an addition—there were several of these holders and they practically matched with each other. The merchant concerned said there were still more, all identical—which worried me (and still does). Although I cannot prove it, I feel

that someone has devised a method of reconstructing amber, in vacuum possibly, leaving no tell-tale traces or signs. I have also seen a slim bottle in "amber", about 6 inches high $2\frac{1}{2}$ inches wide and about 1 inch thick, absolutely without any inclusion, feather, striae, etc., in fact so utterly clean as to look plastic beyond belief—this sort of thing I find hard to accept. Among the very normal tests we do, we are enlivened every now and then with not so much a variety as a "variation on a theme". One such item recently was a square emerald-cut green stone mounted fairly importantly in a heavy gold brooch. It was passed to me by my colleague for observation on the rather curled nature of the feather inclusion. The feather at first glance seemed to be of the hydrothermal type of 2-phase droplets and when viewed through the Chelsea filter was a poor brownish-red. The stone looked wrong for emerald and too poor for synthetic emerald. It had a straight-line colour-break, which could have been part of hexagonal structure zoning. The feather and colour decided me to take its R.I., which was 1·434. All factors added up precisely and accurately for fluorspar. A very nice fluorspar—just a little different to mundane emerald.

* * *

We had a solid hoop ring of mottled opaque green and white colour. It looked like jadeite, it had a density of 3·221 and a faint chromium spectrum with a faint band in the blue, a hardness (or softness) *easily* scratched by a steel broacher, and a fluorescence colour of a light honeyish yellow/green under x-ray excitation. We feel it could well be included under the umbrella name of Saussurite. Perhaps one day we shall be really proficient in the use of our own soon-to-be-installed powder-diffraction camera. We hope to be that much more positive in the identification of rocks and mixtures of minerals.

* * *

These few items may seem small beer, but they are the little pieces of cake which make bread and butter routine that much more palatable. There would seem to be room in these last few lines for afterwords on apatite, but perhaps I am making too much of a meal of it?

R.I. ANOMALIES IN TOURMALINE AND A STRANGE ZIRCON

By R. KEITH MITCHELL, F.G.A.

PAPERS by Chas. Schiffmann[1] and Prof. Dr Hermann Bank[2] have reported on experiments which appear to prove that the strange multiplicity of refractometer readings in certain tourmalines, first reported by me in 1967[3], is no more than skin deep. Areas on stones giving four or more R.I. readings, when repolished or recut, were found to give only the normal two readings, and in each case these were the lowest of those obtained before repolishing. These findings deserve further comment.

First, the suggestion by J. R. Jones reported in Schiffmann's paper cannot be accepted. Tourmalines, and indeed most other minerals, cannot undergo temporary alterations to their refraction which will go away in time. The suggestion that a Beilby layer was responsible for the anomalous effects is also rightly dismissed. Sir George Beilby postulated that heat and friction in polishing produced an amorphous layer which only in some instances re-crystallized on cooling. This layer is far too thin to influence any refractometer readings. Assuming that, in these cases, the Beilby layer were thick enough to register on the refractometer scale, the result would be either the single reading for an amorphous substance, or *three* values; two for the normal R.I. of the stone and a *lower* one for the amorphous layer, which would be thin enough to allow the crystalline R.I.s to be determined.

The writers mentioned above seem to have established with reasonable certainty that the anomalous multiple indices must be due in some way to the effects of heat. The chemical composition of tourmaline is well known for its complexity. The hydroxyl radical is a conspicuous item in the formula, while fluorine is a possible constituent element. In the case of topaz, fluorine leads to lower R.I.s than are found in those containing the OH radical. It seems to me probable that over-heating the tourmalines in some way alters the balance of these two factors in the outer layer of the stone, possibly by oxidation, and that a surface layer develops with higher refractive indices than the main body of the stone but still doubly refracting and thin enough to allow the true values to register through it on the refractometer.

A suggestion for further experiment occurs to me. Having restored an abnormal stone to normality by repolishing, I feel that an attempt should be made to return it to the multi-reading state by reheating. Success in this would prove beyond reasonable doubt that the initial effect was due to careless heating.

I think I was the first to report this strange phenomenon in print. However, the multiple R.I.s were brought to my attention by Dr C. J. Kerez, F.G.A., who, in 1965, was an exceptional student of mine, then living in Brazil. Credit where credit is due—I suggest the multiple R.I. effect be henceforth known as the Kerez Effect.

Much more recently I have encountered another strange stone, a drop-shaped zircon of 14·33 carats which, when taken from its stone paper, is a golden, almost orange-brown colour. About ten minutes exposure to sunlight reduces it to a dull brown, more nearly resembling that of cairngorm quartz. Several weeks of total darkness are needed to bring it back to its original colour. So far the phenomenon seems to be reversible *ad infinitum*. Obviously such phenomena must be due to changes in the stone's absorption of light. But the colour of a gem is due to the light it transmits and only in a negative way to the absorption lines which are the easily observed aspects of a spectrum. This zircon shows no apparent changes in its absorption spectrum, while any changes in the transmitted regions are too subtle to be observable in the normal use of the hand spectroscope. The absorption spectrum is in fact limited to a single very faint line at 6535Å, typical of most reddish brown zircons.

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THE "JEWELER'S EYE": A REPORT

By ROBERT WEBSTER, F.G.A.

HAVING discussed and evaluated the *Gemeter* and the *Gemeter* '75, [1, 2] the writer, through the courtesy of Dr W. W. Hanneman, of Hanneman Lapidary Specialties, Castro Valley, California, has been allowed to examine the electronic gem-tester called the *Jeweler's Eye*.

This instrument, which was designed by Dr Hanneman, is comparatively small, being approximately 4½ inches (11 cm) in width, 2¼ inches (5·5 cm) in depth and 2 inches (5 cm) in height. The whole instrument fits into a durable soft case made of "Nangahyde", a material used extensively in the United States for high-class upholstery. The whole (instrument and case) is of such a small size as to fit into a standard U.S.A. shirt pocket, or most certainly in a brief or executive case. (Fig. 1).

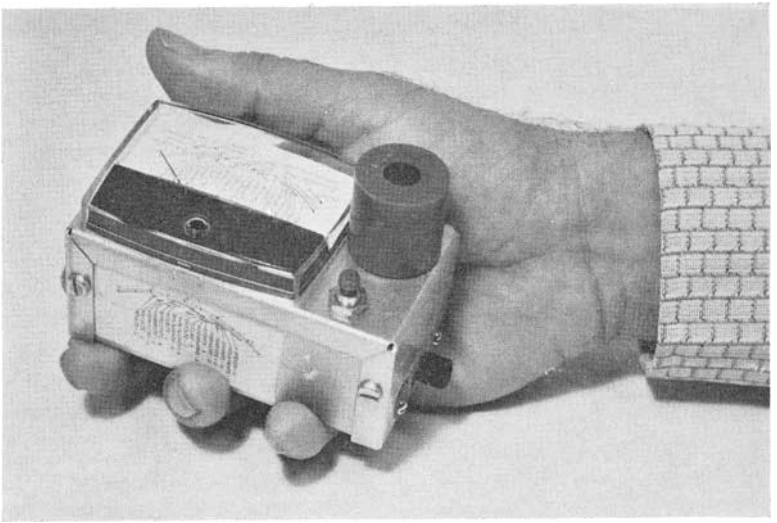

FIG. 1. The *Jeweler's Eye*.

As with the *Gemeter*, the *Jeweler's Eye* operates on a beam of infra-red rays and probably uses a similar "sensor".[2]

The instrument is most compact, with the meter, examination disc and push-button switch all mounted on the top of the box-like casing. However, on one end face there is a two-way switch, which allows either of two ranges marked on the meter to be used. (Fig. 2). The general layout of the circuitry is shown by Fig. 3. The instrument is powered by a nine volt dry cell and this may contribute to the more consistent performance shown by the *Jeweler's Eye*. Before discussing the performance of the instrument, it may be as well to give some consideration to the maker's literature.

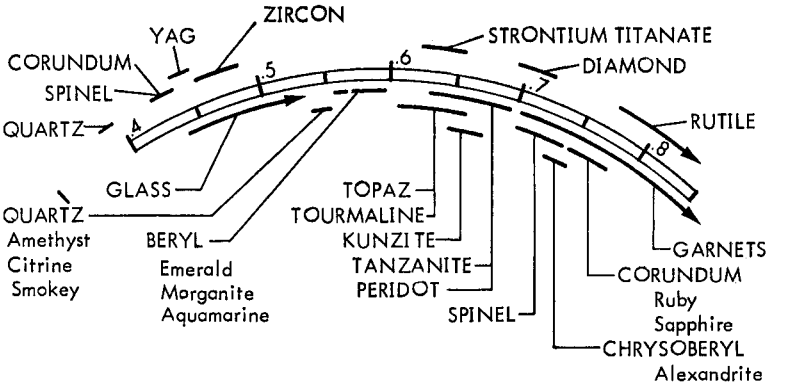

FIG. 2. The meter scale used in the *Jeweler's Eye*.

In the literature the maker makes no pretentions that his instrument will replace the refractometer which measures the critical angle of total internal reflection: indeed he is careful to point out that refractive indices, as given in gem textbooks, are based on the index as measured using the D line of sodium, but the electronic instruments are using a band in the infra-red with a wavelength of getting on for a micron—anyway somewhere about 900 nm. Dr Hanneman states that one cannot call these electronic instruments gem refractometers because a gem refractometer measures the refractive index for the wavelength of the sodium line (n_D), which the electronic instruments cannot do. For each gem there is a different *index of refraction* (n) for every wavelength, but there is only one *refractive index* and that is by definition the index of refraction obtained by using sodium light (n_D). There are also pointed out

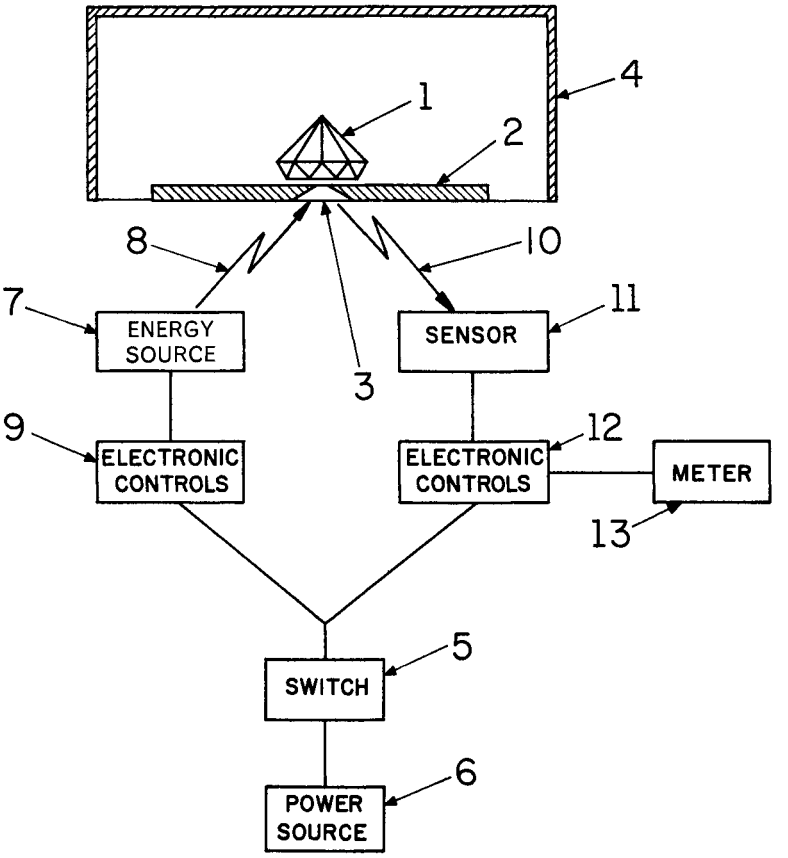

FIG. 3. Schematic diagram showing general layout of the circuitry of the *Jeweler's Eye*. Polished gem (1), placed on baseplate (2), with hole (3) in baseplate completely covered. Opaque cover (4) to eliminate external light. Closing of switch (5) provides energy from power source (6) and causes energy source (7) to radiate energy (8) in direction of hole (3). Intensity of energy is regulated by electronic resistors and circuits (9). Reflected rays (10) are intercepted by sensor (11) whose response is converted by electronic circuits (12) into visual response on the meter (13).

the deficiencies inherent in using Fresnel's reflectivity in the infrared. It is emphasized that a clean well-polished surface is essential, which many gemstones do not have, although they may appear to have such surfaces, and it is also mentioned that the instrument will *not* read birefringence or optic sign. Dr Hanneman is careful to point out that the *Jeweler's Eye* is not a precision instrument but is a useful tool.

In personal communications Dr Hanneman explains the reasons for some of the anomalies found by various workers who have used these instruments and have found high- and low-reading results. Low results are mainly due to badly polished or unclean stones, high readings being due to internal reflections inside the stones. The reason for the lower reading for strontium titanate than for diamond as shown by these electronic instruments may be explained by reference to Fig. 4. This graph shows the relationship between the index of refraction (n) and the wavelength of light used to determine it. The graph shows that the change of index of

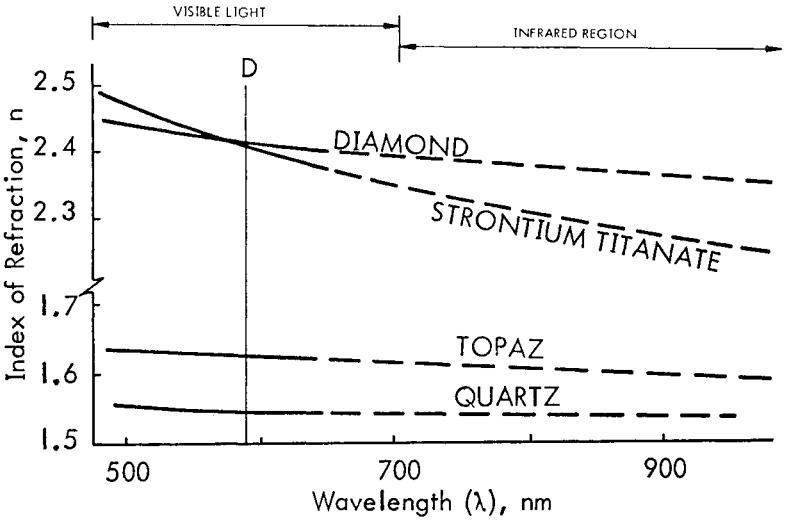

FIG. 4. Dependence of Index of Refraction upon wavelength of Energy.

refraction (n) over a range of wavelengths (λ) is different for diamond and strontium titanate. Mathematically this can be

expressed as follows:

$$\frac{\Delta \text{ n (diamond)}}{\Delta \lambda} \neq \frac{\Delta \text{ n (strontium titanate)}}{\Delta \lambda} ;$$

dispersion being defined as $\frac{\Delta n}{\Delta \lambda}$ = dispersion.

Experiments to ascertain the performance of the *Jeweler's Eye* showed that the claims of the makers were valid and in the main the readings obtained were fairly consistent. Some anomalous readings were found to occur, but these were most probably due to the factors mentioned above, and in this connexion Dr Hanneman is wise in stating that the instrument is more safely handled by a trained gemmologist than by an untrained assistant, as the former is more likely to spot any inaccuracies of readings due to a badly polished stone or to internal reflections of a secondary nature.

The examination disc is much smaller and has a smaller diameter aperture than in the *Gemeter* and this allows readings to be taken with stones having fairly small table facets. The disc has a flat surface with no markings, and, thankfully, there is no "nipple". The nearness of the examination disc to the meter and the push-button switch rather precludes the stones in a fairly large piece of jewellery from being tested with ease. This of course must be accepted with an instrument designed on the small side. If the disc could be raised above the meter glass and the switch, this might be an answer, but it might entail manufacturing problems. The small cylindrical covers for the examination disc seem to have a tendency to pick up fluff by electrostatic attraction and it might have a deleterious effect if fluff gets into the "sensor" hole.

The results obtained with some Y.A.G.s seem to read higher than the scale on the meter indicates. It might be mentioned that printed subsidiary scales pasted on the base and back of the instrument indicate the meter positions for the more unusual stones, and in one of these the Y.A.G. line slightly overlaps that of zircon and this seems to be a truer version for Y.A.G. The line on the meter itself needs to be similarly extended—it is a minor criticism.

To sum up: these electronic instruments may, to some extent, be said to be still in their infancy, but they could have reached their potential, as the limiting factor is still the polish on the gem and no improvement in the instrument will overcome this. What these

electronic instruments will do is to give some satisfactory means of identifying the newer man-made (synthetic) stones which have a refractive index above the "threshold" of the ordinary refractometer. In conclusion, it can be said that the *Jeweler's Eye* is the best of these "reflectivity" instruments which the writer has so far seen.

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PERIDOT — THE GREEN STONE

By S. B. NIKON COOPER, B.D., F.G.A.

ACCORDING to the Oxford Dictionary of English Etymology (1) the name "peridot" derives from the Old French, can be traced back to the XIVth century, but is "of unknown origin". The Encyclopaedia Britannica (2) agrees with this: "the word peridot is an old trade-term, of unknown origin, used by French jewellers and introduced into science by J. R. Haüy."

Of unknown origin? The writer of this article believes in words; believes that they have a meaning; and, as a general rule, the more ancient the word the more literal its meaning. Let us consider the evidence available from early sources.

In Peterborough 33,(3) a MS from the late XVth century, we have the following entry: "Periot is a stone that is lygt grene"; and, obligingly, a footnote: "apparently the same as the peridon of The Second Lapidary of Engraved Gems". Turning to this source (4) we have a (mainly prose but partly verse) MS—Gonville and Caius Coll. Camb. 435—of the XIIIth century, where we read: "Peridon est piere verz". Not much is known of it ("De ses vertuz ne sui pas cerz") but at least the colour is there—green.

Also from the XIIIth century, Albertus Magnus: in his Book

of Minerals[5] II, ii, 14, under "perithe, or peridonius" we read: "there is said to be another variety of this which is similar to chrysolitus, except that it is greener." And again, another entry under "virites" (II, ii, 19): "virites is the gem which we have called peririte above" (referring to the II, ii, 14 entry). The point is made that this may be merely a copyist's error for "pirites" (pyrites)—inserting "V" instead of "P"—or may be a confusion with viridis—green.

A confusion? It would give a clear and exact meaning for describing this "new" gem—the one point on which all the authorities agree: its colour. The progression would seem to be: Virites→Pirites→Peririte = Peridonius→Peridon→Peridot.

But why was there a need in the XIIIth century for a new name? The stone was already known. We can recognize it easily enough in Pliny's excellent description of "topaz"[6], the stone which "yields to the action of the file", and which "admits, too, of being worn by use". It is beyond doubt that his "topaz" is our modern peridot. As additional proof, he classes "topaz" among his "green" stones. Why not keep the name "topaz" then? Why this need for a new name?

The answer would seem to lie in the gradual change of meaning which the name "topaz" had undergone. From Pliny (Ist century): a green stone, of low hardness (our peridot); through to Isidore[7] (VIIth century)—again under "green" gems ("de viridioribus gemmis. . . Topazion ex virenti genere est. . ."), an account which follows Pliny—including the famous story of how it was discovered, by accident, when the stranded Trogodyte pirates ("troglodytae" in Pliny) dug up the gem in their frantic search for edible roots. . .; but by the time of Bishop Marbode[8] (XIth century), there is a change. Topaz now has a golden colour ("alterius puro color est vicinior auro").

Again, from the MS Cotton Tiberius AIII:[3] "Topaz, which is like gold". Albertus Magnus (XIIIth century), in his "Book of Minerals"[5] II, ii, 18, cites two varieties: "one of them is entirely similar to gold, and this is the more precious. The other is yellow, but more transparent than the colour of gold, and this is less valuable." Again, MS Douce 291[3] (XVth century): "Topace is of yelowe colour. . ." And finally, Peterborough again[3] (the same source that gives us "periot"): "Topaces is a stone that hath a yelowe color."

From this we can see that from the XIth century onwards "topaz" has changed colour—to become the golden yellow stone we know today (and incidentally, how many people now would classify as "topaz" the more common colourless or light blue varieties? No, "topaz" is a yellow stone—everyone knows that!)

It only remains to ask where was "topaz" before the XIth century? This is a matter of conjecture, but the most likely claimant would seem to be "chrysolithos" (literally "golden stone")—the "chrysolite", which in some countries still, unfortunately, persists even today as a name for "peridot". If we accept this, we have the apparent paradox of Pliny's "chrysolithos" becoming our "topaz", and his "topaz" becoming our "chrysolite" (or, more correctly, our "peridot")!

I submit, though, that we have a plausible root-source for "peridot". . .that it stems from "virites"—the "green stone".

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GREEN GEM HERDERITE FROM BRAZIL

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A BEAUTIFUL green Brazilian gem weighing 5·90 ct (NMNH Gem #4948) and reported to be herderite was acquired by the U.S. National Gem Collection in 1973. During a routine verification of this gem, prior to a computer indexing of the Gem Collection, abnormally low refractive indices were noted by one of the authors (W. W.), and the following investigation was initiated.

Herderite, $CaBe(PO_4)(F,OH)$, and the analogue hydroxyl-herderite, $CaBe(PO_4)(OH,F)$, are seldom encountered as gem materials. Crystallizing in the monoclinic system, it has a hardness of 5–5½. As a late-stage hydrothermal mineral in granite pegmatites, herderite is most frequently encountered as brown or grey, thin botryoidal masses, occasionally coating beryllonite. Crystals are found in micro sizes, and large non-gemmy light brown crystals up to 5 × 12 cm have been found in Brazil and at the Fletcher mine, Groton, New Hampshire. Herderite and hydroxyl-herderite are similar, if not identical, in appearance, and available optical data for analysed members of this series are scarce in the literature, compounding the difficulties of investigators who wish to characterize a gem of this series accurately.

The gem herein described is light green, oval brilliant-cut, with the hue and intensity of the Tanzanian green grossular. It is free from visible imperfections, and no diagnostic inclusions were noted. There was no apparent absorption spectrum. Refractive indices measured in sodium light with the Rayner Dialdex refractometer are $\alpha = 1{\cdot}581$, $\beta = 1{\cdot}601$, and $\gamma = 1{\cdot}610$ ($\pm 0{\cdot}002$), with birefringence of 0·029, optically negative. The indices were determined on a number of facets to insure that the maximum and minimum values were obtained.

The pleochroism is very weak. The dispersion is moderate, r > v, 0·017 (B-G), measured with the Dialdex refractometer for the X-vibration direction (α–index).

Previously published refractive indices for gem herderite (Webster, 1970) of $\alpha = 1{\cdot}594$, $\beta = 1{\cdot}613$, and $\gamma = 1{\cdot}624$ are considerably higher than the values for our gem. Since fluorine substituting for hydroxyl in other phosphate minerals such as amblygonite and

apatite causes a lowering of the refractive indices (Switzer *et al.*, 1965), it was thought that the gem in question could be fluorine rich, and that the indices given by Webster might be for a hydroxyl-rich member.

Analysis for fluorine content was carried out with an ARL Electron Microprobe operating at 15kV, with a sample current of 0·15μA. The fluorine content was determined to be 7·01%, indicating that the gem is indeed herderite with F > OH, but near a midpoint in the series.

When exposed to ultraviolet radiation, the gem fluoresces a pale violet in short-wave and a stronger violet in long-wave. No phosphorescence was noted. The stone fluoresces strongly in CuKα x-radiation with a pinkish-orange colour. After a thirty second exposure to x-rays, there is a very persistent phosphorescence lasting 30 minutes. Webster (1970) noted an orange glow with persistent phosphorescence under x-rays, but this material fluoresced pale green under ultraviolet.

The specific gravity, determined on a modified Berman-type balance, is 3·02 ($\pm$0·01). This is somewhat higher than the calculated value for herderite (2·98), but within acceptable limits. Powder scraped from the girdle of the gem was x-rayed and gave the pattern of herderite. Although the x-ray powder patterns of herderite and datolite are very similar, the higher optical constants of datolite, combined with the absence of silicon, as proven by the microprobe, remove all doubt. Therefore, we are able to confirm that the green gem is herderite.

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ON THE OCCURRENCE OF GEM CORUNDUM IN KOLONNÉ

By HERBERT S. GUNARATNE, F.G.A.
State Gem Corporation, Sri Lanka (Ceylon).

IN early 1973 my colleagues and I of the State Gem Corporation, Sri Lanka, were confronted with a flood of rough blue sapphires, quite unlike the ones hitherto found among the gem gravels of Sri Lanka. These were of a very good colour. The majority of the stones bore their original crystal shapes and more often than not the stones were fissured. The stones came from regions around Kolonné, a place about 15 miles north west of Embilipitiya, in the Ratnapura District—the most famous gem district in Sri Lanka. Very soon these stones were popularly dubbed "the Kolonné Stones". However, not long afterwards the Kolonné stones disappeared from the market and it was not till the latter half of the year 1974 that these stones made their re-appearance. The gem deposits of Kolonné had been rediscovered. The earlier stones were predominantly blue sapphires, whereas the stones that reached us later were predominantly blue star (asteriated) sapphires.

General Observations

The majority of Kolonné stones bear their original crystal shapes and the stones are essentially blue corundums. The crystals are large and well developed (euhedral). These crystals have a cementation or encrustation around them and all are characteristically fissured. The blue sapphires are real quality stones. On the other hand the "silky stones" which should produce asterias proved to be rather disappointing, in the sense that a majority of them failed to produce the expected result on fashioning. In a large number of cases the stars did not show up although the colours remained good. Rubies had not been known to occur in this region.

Problems

Occurrences of this nature pose a fair amount of questions and problems, some of which, of course, may not find ready answers. To my mind there are three salient issues that need explanation, two of which could be settled with field data, while the third remains a problem for the laboratory. Firstly, it is the question regarding the nature of the occurrence—is it an "in situ" occurrence where the gems are found in the parent rock itself, or is it secondary in nature? Secondly, an explanation is necessary for the characteristically fissured nature of the crystals. Thirdly, why is it that

most of the "silky stones" of the nature which should normally produce asterias do not show up the effect as expected when fashioned? This last problem no doubt needs detailed analysis in the laboratory and in due course will receive attention.

It was with these issues in mind that a team of gemmologists from the State Gem Corporation of Sri Lanka set off for the site in late September, 1974. From Kolonné it is a trek of about four miles to this site, through undulating scrubland terrain. The effort involved and the energies spent were certainly rewarded. A typical area is Opalla, a region characterized by calcic rocks and isolated pegmatite outcrops. It is these pegmatites that are significant in relation to the gem occurrence at Kolonné. The pegmatite outcrops are large and isolated and consist of large crystals. A characteristic mineral seems to be diopside, the crystals of wh'ch are sometimes as long as 6 inches. It is from the periphery of these pegmatite outcrops (where a fair amount of weathering and decay is noticeable) that the gemstones are retrieved from the parent rock. Blasting is sometimes resorted to.

The occurrence of isolated pegmatite outcrops too call for an answer—its answer ties up well with the nature and occurrence of gemstones in the area. The pegmatites appear to be the result of a cooling phase of residual magmas, apparently isolated in reservoirs which had defied solidification for long periods. It follows that the surrounding rock magma did solidify leaving behind the residual magma-filled pockets to solidify at some later phase. These pockets, owing to some phenomena, solidified and crystallized extremely slowly, providing ample opportunity for the free floating chemical atoms to aggregate to form large and well developed crystals of the nature that are typical of the Kolonné pegmatites. As a consequence of delayed cooling, fissuring of crystals—particularly the larger ones —is a likely result. While cooling, gases and vapours are released, thereby decreasing the prevailing pressures within the reservoirs. These areas were immediately acted upon by pressures from the surrounding areas—compressional forces from the already solidified surrounding regions converged on the reservoirs and this naturally resulted in the fissuring of minerals that had already crystallized within. It is this fissuring of minerals that is quite evident and is even typical of the Kolonné stones.

While this region may be considered a type area in Sri Lanka where gem corundums occur in parent rocks, it is also an area where secondary deposits could be located.

Gemmological Abstracts

ARNOULD (M.) and POIROT (J.-P.) *Spectrographie infrarouge par réflexion de la turquoise et de quelques-uns de ses substituts.* (Infra-red reflection spectroscopy of turquoise and some of its substitutes). Bulletin de l'Association Française de Gemmologie, 1975, 44, 9-10.

A polished surface of the material is subjected to a beam of polychromatic infra-red light and the reflection analysed by an apparatus which measures the reflective power of the surface. It was found that natural turquoise even when its colour was altered or if it had been impregnated with coloured plastic, gave predictable readings but that the synthetic material gave an appreciably different picture. M.O'D.

BALL (R. A.) and BURNS (R. L.). *Agate.* Australian Gemmologist, 1975, 12, 5, 143-150. 12 illustrations.

Although complete in itself this article is only part 1 of a series. This first part examines critically the various theories which have been put forward to account for the composition and formation of chalcedony. There is a full discussion of the cause of the rings in agate. Amygdales with unusual features are discussed, as are also the probable conditions under which silica forms opal, chalcedony and quartz. There is an excellent list of references. This is a most useful article, which gives a very good survey of the problems of the formation of silica minerals. R.W.

BARRINGTON (E. N.). *Electromagnetic resonance in yellow sapphires.* Australian Gemmologist, 1975, 12, 5, 159-160.

Tells of a visit to Monash University in order to see the working of the equipment used for experiments using electro-magnetic spectroscopy and to carry out some research with reference to yellow sapphires. The equipment consists of a source of constant radio-frequency which is passed down a hollow rectangular tube "wave-guide" so as to bombard the object under test. The test object is located within a controllable electromagnet, which allows orientation of the specimen, alteration of the direction of the magnetic field and its strength, the radio-frequency all the time being constant. After bombarding the test piece, the emergent radio waves are captured and fed into an oscilloscope which shows amplitudes of the signal in response to any resonance that occurred within the test piece. The results of some experiments are detailed. R.W.

BECHBERGER (PAUL). *Franklin fluorescents.* Mineral Digest, 1975, 6, 6-19.

An account profusely illustrated in colour of the fluorescent minerals of Franklin, New Jersey. M.O'D.

BROOKES (C. A.) and MOXLEY (B.). *A pentagonal indenter for hardness measurements.* Journal of Physics, E: Scientific Instruments, 1975, 8, 456-60.

Most indentation tests for hardness are affected by anisotropy on single

crystals. The new pentagonal indenter gives results which are not affected by the orientation of the facets of the indenter and the crystallographic nature of the surface tested. The indenter takes the form of a regular pentagon-based pyramid with angles of 65° between each face and its geometric axis. M.O'D.

BROWN (R. E.). *The discovery of cap-quartz in northern New South Wales, Australia.* Australian Gemmologist, 1975, 12, 5, 156-159. (Reprinted from the Lapidary Journal of October 1974). 4 illus.

Cap-quartz is a quartz crystal which is made up of separable layers or caps due to the deposition of a little clayey material being deposited at intervals during the growth of the crystal. The New South Wales deposit occurs in a quartz pod in a host rock of kaolin pegmatite. The crystals lining the inside of the pod are short and stumpy. The cap crystals, however, form the base of the pod and are composed of kaolin-rich quartz and are a grey-blue in colour. Some crystallographic characters are considered. R.W.

CASSEDANNE (J. P.) and (J. O.). *Les opales du Rio Corrente (Pedro II, Piaui, Bresil).* (Opals of Rio Corrente (Pedro II) Piaui, Brazil). Bulletin de l'Association Française de Gemmologie, 1975, 44, 1-4.

An earlier account of opal from Brazil appeared in no. 16 of this journal; the localities presently discussed are at Fazenda Roça and Fazenda da Barra. Together with the location at Boi Morto already discussed these two sites are the main opal producers at the present time. They are situated in the north of Piaui state between Fortaleza and Terezina, close to the frontier with the state of Ceara. At Fazenda Roça the rocks are Devonian and there are some occurrences of laterite. Opal is found both in rock and alluvially. At Fazenda da Barra the opal is found in boulders of diabase. Constants of the opal from Fazenda Roça are S.G. 2·09, H.6, R.I. 1·458, no luminescence. Opal from Fazenda da Barra has S.G. 2·10-2·11, R.I. 1·458. Hematite is closely associated with the opal. M.O'D.

CLAYTON (N. A.). *Classification & nomenclature of precious opal.* Australian Gemmologist, 1975, 12, 5, 152-154.

A compilation of the data amassed by the late Jack Oughton on the subject of opal classification and nomenclature, his notes having finally been drafted into an article by the author. R.W.

FLAMINI (A.), GRAZIANI (G.) and GRUBESSI (O.). *Inorganic inclusions in amber.* Archaeometry, 1975, 17, 1, 110-112. 8 illus.

Examination of inorganic inclusions (which are described) in reddish Sicilian and yellow Baltic ambers using a scanning electron microscope with a Si/Li solid state non-dispersive detector (simultaneously allowing a stereoscopic view and a semi-quantitative analysis)—the only sample preparation being metalization of the specimen with a 50Å graphite layer and superposition of an exceedingly thin gold layer on the graphite layer—is claimed to show that the method adopted contributes effectively to the differentiation of ambers from different sources. J.R.H.C.

FRANCO (R. Ribeiro). *A síntese de minerais e de outras substâncias de interesse gemológico.* (Synthesis of minerals and other substances of gemmological interest). Gemologia, 1974, 20, 40, 21-32.

A survey brought up-to-date from an article published in the same journal (Vol. 10, No. 34) in 1966. Some comments on YAG not included in the original article appear here. M.O'D.

SCALA (C. M.) and HUTTON (D. R.). *A definitive test for golden sapphires.* Australian Gemmologist, 1975, 12, 5, 160-161. 1 table; 1 graph.

This article is really a carry on from Barrington's article abstracted above. The article reports the results of the examination of natural and synthetic yellow, blue and brown sapphires, and a synthetic ruby by microwave magnetic resonance spectra. The spectra due to iron were stronger in the natural sapphires, while the spectra for chromium were weak or not present. In the case of the synthetic stones the reverse was true, for the iron spectra were weak and the chromium spectra strong. In the synthetic ruby there was no trace of iron. R.W.

SENIOR (B. R.). *Precious opal in Queensland.* Australian Gemmologist, 1975, 12, 5, 155. (Reprinted from an unpublished report in Bur. Miner. Resour. Rec. 1974/35).

A short article on precious opal deposits of Queensland. It tells of the alteration of the area rocks during the late Cretaceous period, which subsequently produced faults and cracks and voids in the ironstone which allowed percolating silica solutions to deposit opal. R.W.

SVISERO (D. P.). *O diamante das regioes centroleste de Mato Grosso e sudoeste de Goias. Pt. 3. Inclusoes minerais.* (Diamond from the east-central regions of Mato Grosso and south-west Goias). Gemologia, 1974, 20, 40, 33-42.

The third part of a survey on diamond from Mato Grosso and Goias, dealing with inclusions of olivine, pyroxene, garnet, chromite and diamond. M.O'D.

WHITFIELD (G. B.). *Emerald occurrence near Menzies, Western Australia.* Australian Gemmologist, 1975, 12, 5, 150-152. 1 map.

Reports the finding of gem-quality emeralds at a new source in Western Australia. The area consists of an ultramafic body which had metamorphosed to a chlorite schist. Across this body run two pegmatite veins, which contain quartz, feldspar and randomly scattered pale green and opaque beryl crystals. At two places on the pegmatite veins the chlorite schist outside the vein for a distance of some 6 metres has been enriched by quartz, and to a lesser extent by emerald crystals which are up to 2 cm in length. The reason given for the formation of emerald within the chlorite schist instead of beryl, which occurs in the pegmatite, is that there is an excess of chromium in the schist. R.W.

BOOK REVIEWS

FALK (Fritz). *Edelsteinschliff und Fassungsformen.* (Gem cutting and setting). Verlag Wilhelm Kempter KG, Ulm, 1975. pp. 150. Illustrated in black-and-white. DM 48.

An account of the use of gemstones in jewellery from the late Middle Ages to the 16th century, this book, at a reasonable price, illustrates some fine pieces mostly from German and Austrian collections. Footnotes refer to the literature and there is an extensive bibliography. M.O'D.

GÖTZ (Friedrich). *Diamanten und Diamantwerkzeuge zum Abrichten von Schleifkörpern.* (Diamonds and diamond working with the cutting of rough). VDI-Verlag, Düsseldorf, 1968. pp. 108. Illustrated in black-and-white. DM 18.

A well-illustrated account of the diamond fashioning process with notes on the tools currently in use. Particularly valuable are the photographs of diamond crystals indicating the various faces and hardness directions. There is a short bibliography. M.O'D.

KIPFER (Alex). *Der Micromounter.* (The micromounter). Ott Verlag, Thun, Switzerland, 1972. pp. 212. Illustrated in black-and-white and in colour. Sw.fr 33·80.

A concise guide to the hobby of micromounting, this is the earliest book I have seen on this subject in a European language. It is well illustrated and contains advice on the preparation of specimens with details of those which necessitate special treatment. There is a section on the choice and use of a microscope. M.O'D.

KIPFER (Alex). *Mineralindex.* (Mineral index). Ott Verlag, Thun, Switzerland, 1974. pp. 206. DM 12·80.

Lists of names of minerals or connected with minerals make up the bulk of this pocket-sized book. English and other foreign names are given their equivalents in German, the main language used. Some obsolete names are unfortunately perpetuated; these would be much better abandoned altogether. Instead almost all gem and mineral books continue to include them while excusing their presence on the grounds of common usage. In most examples this is simply not the case and greater concentration on original rather than second-hand sources would quickly relegate these names to oblivion. M.O'D.

KÜHNEL (Walter). *Nutzbare Mineralien.* (Useful minerals). Wilhelm Goldmann Verlag, Munich, 1972. pp. 232. DM 36.

An account of the use of minerals in pharmaceutics, cosmetics, chemical technology, paper-making and other industries. The minerals are described in alphabetical order and their constants and occurrences are also given. Each entry also has references to the relevant literature; there is a general bibliography and an index. A most useful and well-written book. M.O'D.

LOCHMÜLLER (Walter). *100 Jahre Schmuck Design.* (100 years of jewellery design). Verlag Hans Schöner, Konigsbach-Pforzheim, 1973. pp. 207. Illustrated in colour. Price on application.

All the illustrations are photographs of the original designs and the reproduction of the colour is especially faithful. All the designs illustrated are German and there is a short introduction. M.O'D.

MÜLLER (G.) and RAITH (M.). *Methoden der Dünnschliffmikroskopie.* (Thin-section microscopical methods). Geologisches Institut der Technischen Universität Clausthal, Clausthal-Zellerfeld, Germany (Clausthalen Tektonische Hefte. no. 14), 1973. pp. 131. Illustrations in the text. Price on application.

A well-illustrated account of the cutting of rock sections to obtain various optical properties. Each chapter has its own extensive bibliography. M.O'D.

PAPE (Hansgeorge). *Der Gesteinssammler.* (The mineral collector). Second edn. Ott Verlag, Thun, Switzerland, 1974. pp. 100. Illustrated in black-and-white and in colour. DM 19·80.

A well-written and illustrated guide to the occurrence of various rocks and minerals, with useful information on geological maps and a comprehensive bibliography. M.O'D.

VISSER (J. M.). *Bijdrage tot de kennis van het medische, para-medische en occulte gebruik van edelstenen en mineralen.* (A compendium of knowledge on the medical, alchemical and magical use of gemstones and minerals). The Hague, Uitgave Mineralen Bulletin, 1967. In three parts, only parts 2 and 3 of which are reviewed here. Reproduced from typewriting.

A most interesting compilation of data covering not only the legendary properties of gemstones but also a number of practical points of identification. Mineralen Bulletin appears to be a newsletter consisting of a single bifolium and in its 36th year in 1972. M.O'D.

VRINDTS (Jozef). *Diamantbewerking.* (Diamond fashioning). Standaard Wetenschappelijke Uitgeverij, Antwerp, 1974. pp. 180. Illustrated in black-and-white and in colour. Price on application.

The main feature of this short book is the provision of diagrams illustrating the fashioning of a cut stone from various types of crystal. All the well-known varieties of cut are illustrated, although some of the more recent cuts making use of thin crystals are not included. There is a chapter on the uses of diamond in industry. A bibliography would have been useful and an index more so.

M.O'D.

ASSOCIATION NOTICES

MR B. W. ANDERSON

A formal document, signed by Professor H. Bank and Dr. G. Lenzen on behalf of the German Gemmological Association, was recently sent to Mr B. W. Anderson. Translated, the citation reads as follows:—

Mr B. W. Anderson, B.Sc., F.G.A. was, by a resolution of the Deutsche Gemmologische Gesellschaft on 27th September, 1975, proclaimed an Honorary Member of the Society, in recognition of his exceptional contributions to the furtherance of gemmological knowledge and his success in arousing interest in gemmology by means of publications and lectures during many successful years as teacher and research worker.

MEMBERS' MEETINGS

London

A talk was given at Goldsmiths' Hall on the 8th October, 1975, by Mr M. J. O'Donoghue, M.A., F.G.A., on "Recent Developments in the Synthesis of Possible Gem Materials". The substance of his talk will be given in a future issue of the *Journal*.

A report of the Presentation of Awards held at Goldsmiths' Hall on the 17th November, 1975, will appear in the April issue of the *Journal*.

North West Branch

At a meeting held on the 27th October, 1975, the North West Branch of the Gemmological Association was formed with the following officials:

Chairman:	Mr John G. Roach, F.G.A.
Hon. Secretary:	Mrs Doreen M. Brook, F.G.A.
Committee Members:	Mrs Mary Doughty, F.G.A.
	Mr Harry Eakins
	Mrs P. Gayton, F.G.A.
	Mr F. E. J. Hewitt, F.G.A.
	Mr S. Hill, F.G.A.
	Mrs Joan Kendall, F.G.A.
	Mr Barry Pearson, F.G.A. (Co-opted)

Any member who did not attend the first meeting of the Branch and who wishes to be informed of its activities should communicate with Mrs D. M. Brook, F.G.A., 22 Moorcroft Road, Allerton, Liverpool, L8 9UG. (Telephone: 051-427 5096.)

Nottingham Branch

A meeting was held on the 13th October, 1975, at the Mechanics Institute, Nottingham, when Mr E. A. Jobbins, B.Sc., F.G.A., gave an illustrated lecture entitled "The Gemstones of South-East Asia".

Scottish Branch

On the 7th November, 1975, Mr H. J. Whitehead, F.G.A., repeated his lecture "The Sri-Lankan Gem Scene" at the Station Hotel, Aberdeen.

Dr Jeff Harris gave an illustrated talk on "Diamond Inclusions" on the 25th November, 1975, at the North British Hotel, Glasgow. Dr Harris, an authority on diamonds, has done research into various aspects of diamond morphology both in South Africa and in Britain.

CONSULTANT GEMMOLOGIST

The United Nations Technical Assistance Recruitment Service wish to recruit a Consultant Gemmologist for a period of four months starting approximately April 1976. This person will be stationed at Kathmandu (Nepal). He will work under the general direction of the Project Manager and in co-operation with the Project Economic Geologist and Mineralogist and will be required to assess the possibilities for exploration and extraction of gemstones in Nepal.

Full particulars of this post are available from the Association at Saint Dunstan's House, Carey Lane, London, E.C.2.

GEM DIAMOND EXAMINATION 1975

Forty candidates entered for the Association's 1975 Gem Diamond Examination, of whom thirty-one qualified. The following is a list of successful candidates arranged alphabetically.

QUALIFIED

Amor Cubeiro, Carmen, Barcelona, Spain.
Anton Martinez, Miguel, Valencia, Spain.
Ballin, Peter Edward, Birmingham.
Blasi Casal, Juan, Barcelona, Spain.
Carbonell Alós, Concepción, Valencia, Spain.
Clayton, Rosamond Susan, Hong Kong.
Cooke, Victoria Jane, London.
Cranton, Keir, New Malden.
Daras, Edith, London.
Din, Richard Aziz, Edgware.
Dwyer-Hickey, Peter Robin, Ilford.
Ferrer Arbona, Santiago, Valencia, Spain.
Garcia Igual, Arturo, Valencia, Spain.
Gonzalez Sanchez, Juan Manuel, Valencia, Spain.
Green, Arnold, Wembley.
Handley, Michael, Horsham.
Ishikawa, Taeko, London.
Latre David, Jose, Valencia, Spain.
Lopez Vaño, Maria Carmen, Valencia, Spain.
Manser, Jutta Elisabeth, Southampton.
Martorell Gisbert, Maria Isabel, Valencia, Spain.

Munne Cardona, Ana Maria, Barcelona, Spain.
Nohara, Koichi, London
Palmer, John Redvers, Hitchin.
Palomares Carbonell, Remedios, Valencia, Spain.
Proctor, V., London.
Sanchez Cabello, Antonio, Valencia, Spain.
Shindler, Albert, Kenton.
Upchurch, David Ward, Colchester.
Vendrell Saz, Mario, Barcelona, Spain.
Villar Lopez, Luis-Fernando, Barcelona, Spain.

EXAMINATIONS IN GEMMOLOGY 1975

In the 1975 examinations in gemmology organized by the Gemmological Association of Great Britain, 728 candidates sat for the preliminary examination and 385 for the diploma examination. Overseas centres were established again in many parts of the world.

Upon the recommendation of the examiners, the Tully Memorial Medal and the Diploma Rayner Prize have been awarded to Mr Michael John Freeman, of Bulawayo, Rhodesia.

The Rayner Prize in the preliminary examination has been awarded to Mr Sten Rundkvist, of Frolunda, Sweden.

The following is a list of successful candidates, arranged alphabetically.

DIPLOMA EXAMINATION

TULLY MEMORIAL MEDAL AND DIPLOMA RAYNER PRIZE

Freeman, Michael John, Bulawayo, Rhodesia

QUALIFIED WITH DISTINCTION

Aguilar Casamayor, Carlos, Zaragoza, Spain.
Brown, Grahame, Brisbane, Australia.
Buhler, Stefan, London.
Domenech Casellas, Maria Victoria, Oviedo, Spain.
Freeman, Michael John, Bulawayo, Rhodesia.
Garcia Abril, Ana Maria, Valencia,
Gomez Perez, Pilar, Valencia, Spain.
Hammett, Roger Stewart, Southall.
Harris, Janet Elizabeth Anne, Stafford.
Jhaveri, Ravindra Jayantilal, Bombay, India.
Lo, Wing Yat Sunny, Hong Kong.
Logsdon, Maxon Andrew, Wethersfield, Conn., U.S.A.
Mayor Giner, Juan Enrique, Vinaroz, Spain.
Noble, Patrick, Heckmondwike.
Ripley, Evelyn, Stockton.
Sanchez Garcia, Paloma, Valencia, Spain.
Tarazona Almenar, Federico, Valencia, Spain.

QUALIFIED

Agee, Carl B., Rotterdam, Holland.
Ahmad, Masud, Wimbledon.
Alvarez Perez, Aurelio, Barcelona, Spain.
Aparisi Miguel, Rafael, Valencia, Spain.
Bartoli, Anne-Marie, Gex, France.
Bassett, Allen M., La Jolla, Cal., U.S.A.
Benjamin, John Circus, Wembley Park.
Bloom, André David, Streetly.
Bootz-Verbunt, Emilie Henri Hélène, Hilversum, Holland.
Bosch Senao, Javier, Barcelona, Spain.
Brauns, Sandra Maureen, Hong Kong.
Bredebusch, E., Hong Kong.
Brooks, Ferriel, Hong Kong.
Burr, Kevin Francis, Guildford.
Capell, E., Port Elizabeth, S. Africa.
Carey, David Alan, York.
Carrera Poblet, Jaime, Barcelona, Spain.
Cartwright, Donald Roy, Little Bookham.
Chandrasena, Kaluthantrige Nimal Ravindra, Panadura, Sri Lanka.
Cidoncha Castellote, Reyes, Valencia, Spain.
Cidoncha Garcia, Miguel Angel, Valencia, Spain.
Clapperton, Elizabeth Morag, Aberdeen.
Cornelius, Richard Alan, London.
Cornford, Carol Rae, East Grinstead.
Cornford, Richard, East Grinstead.
Crawley, Annette, Liverpool.
Dissanayake, Jayasinghe Muhandiram Ernest, Hounslow West.
Diniz, David C., Hong Kong.
Erling, Patricia, Helsinki, Finland.
Frowein, Carl Richard, Stellenbosch, S. Africa.
Grant, Malcolm John, Fordingbridge.
Haddy, H. J., Melville, W. Australia.
Hewitt, Leonard Eric, Lincoln.
Holness, Malcolm Henry, Effingham.
Horder, Heather Aileen, Windsor
Houghton, John Anthony, New Malden.
Hoyos Guerrero, Miguel Angel, Madrid, Spain.
Hughes, Charles James, Newfoundland, Canada.
Hummel, Frank August, Weiser, Ida., U.S.A.
Hutchinson, Janice, Plymouth.
Imai, Takayasu, London.
Iwahori, Mitsuo, London.
Jackson, Brian, Edinburgh.
James, Alan Roy, Walsall.
Javeri, Kishan B., Kobe, Japan.
Jones, Alison Rena, Woking.
Jucker, R. W., Idar-Oberstein, W. Germany.
Kalevi, Roine Usko, Jarvenpaa, Finland.
Kan, Eishi, Tokyo, Japan.
Kennedy, Esther I., Charlotte, N. C., U.S.A.
Kortelainen, Sirpa, Helsinki, Finland.
Kuo, Jung Chou (Eishu Kaku), Los Angeles, Cal., U.S.A.
Laine, Simo E. W., Helsinki, Finland.
Langaard, Conrad, Hanau, W. Germany.
Leewis, P. E., Schoonhoven, Holland.
Leslie, C. Elisabeth, Hong Kong.
Leyser, Gerarda Sebilla Margot, Arnhem, Holland.
Lowe, Peter Eric, Windhoek, S. W. Africa.
Marsal Astort, Montserrat, Barcelona, Spain.
Matthesius, Johannes Gerardus, Amstelveen, Holland.

Maurer, Robert J., Brentwood.
Miller, Charles Robert, Southfield, Mich., U.S.A.
Miller, Wilda L., Pretoria, S. Africa.
Mones Mendoza, Jose, Barcelona, Spain.
Morrill, Christine, Cambridge.
Moule, Alexander John, Brisbane, Australia.
Obiols Mundet, Agustin, Barcelona, Spain.
Padro Tortajada, Angeles, Barcelona, Spain.
Paul, Anne Carse, Hong Kong.
Paulin, Per Philip Elon, Uppsala, Sweden.
Petersen, Graeme Edward, Lower Hutt, N. Z.
Phillipson, Erica, Boxmoor.
Rappitt, Toby James, Maidenhead.
Read, Peter George, London.
Rossetti, Luigi, Idar-Oberstein, W. Germany.
Round. Anthony William Reginald, Epsom.
Rowe, Elaine, Brierley Hill.
Sandberg, Dag, Kjeller, Norway.
Scavia, Fulvio, Milan, Italy.
Schulze, Heinz, Austin, Tex., U.S.A.
Shida, Junko, Kanagawa Pref., Japan.
Stanford, Paul L., Guernsey.
Strachan, Anne R. N., Hong Kong
Sweeting, Penny J., London.
Sze, Yeong-Miin, São Paulo, Brasil.
Tenkate, Iris, Schoonhoven, Holland.
Teske, Jan, Lisse, Holland.
Tester, Robert Edward, Gibraltar.
Tolmie, Andrea Joan, Stonnall.
Tolmie, Nigel Lester, Stonnall.
Vainio, Erkki, Helsinki, Finland.
Van, Bodil Ann-Catrin, Hong Kong.
Van Westen, Linda Justina Louisa, Eindhoven, Holland.
Vander-Heyden, Eveline, Barcelona, Spain.
Warr, David Arthur, Hardwicke.
Williams, Jack Daniel, Philadelphia, Pa, U.S.A.
Wisdom, Terence Roy, Chorleywood.
Wong, Leung Kim Po, Joanna Hong Kong.
Yano, Kiyoko, Kobe, Japan.
Yoda, Mitsuhiro, Tokyo, Japan.
Young, Martin J. P., Aberdeen.
Zoppi, Marco, Flims-Dorf, Switzerland.

PRELIMINARY EXAMINATION

RAYNER PRIZE

Rundkvist, Sten, Frolunda, Sweden

QUALIFIED

Aaby, Jens-Erik, Oslo, Norway.
Abeyesinge, Roland Gomis, Colombo, Sri Lanka.
Abeyratna, Nayana Savitri Sudharshana Kumari, Colombo, Sri Lanka.
Abeywardena, Hettiaratchige
Adamally, Duraiya, Colombo, Sri Lanka.
Akthar, Abdul Sather, Beruwela, Sri Lanka.
Allen, Michael John, Truro.
Aloy, Richard N., Bromley.
Alston, Evelyn Jetta, Pretoria, S. Africa.
Alvarez Perez, Aurelio, Barcelona, Spain.
Ambalavanar, D., Colombo, Sri Lanka.

Ambros Perez, Jaime, Barcelona, Spain.
Anandavadivel, Kumarasamy, Ratmalana, Sri Lanka.
Andersson, Arild, Oslo, Norway.
Arguijo Lopez, Antonio, Barcelona, Spain.
Armitage, Kevin Paul, Rotorua, N. Z.
Arseculeratne, Raphael Barnes, Colombo, Sri Lanka.
Asano, Shinichi, Sendai-City, Japan.
Asano, Yoshio, Tokyo, Japan.
Ashton, Michael, Luton.
Asokaudayamitta, Ekanayake Mudiyanselage, Moratuwa, Sri Lanka.
Aspinall, Paul, Higher Bebington.
Atapattu, Niruala Kumari, Mount Lavinia, Sri Lanka.
Atukorala, D. P. K., Boralasganuwa, Sri Lanka.
Aunon Armero, Pascual, Valencia, Spain.
Ayres, Thomas David, Farnham.
Baird, Donald Douglas, London.
Baker, Elaine C., Lihue, Hawaii
Bakker, Elizabeth, Delft, Holland.
Balasubramaniam, Mylvaganam, Mount Lavinia, Sri Lanka.
Baldock, Lynette, Neston.
Balendra, Kailasapillai, Colombo, Sri Lanka.
Bapat, Suresh Balaji, Bombay, India.
Barclay, William H., Quebec, Canada.
Barlow, Clifford Maurice, Coventry.
Bassett, Allen M., La Jolla, Cal. U.S.A.
Bastinsz, Maxwell Anthony, Colombo, Sri Lanka.
Beal, David William, North Watford.
Bedford, Richard John, Sheffield.
Behennah, Frank Ernest, West Moors.
Bell, Howard Hershey, Hanover, Canada.
Beng, Goh Kong, Petaling Jaya, W. Malaysia.
Bennett, Lise Christine, Gillingham.
Bhaskaran, G., Bombay, India.
Biggs, Margaret Irene, London.
Bingham, Edward Dean, Nevada, Ia, U.S.A.
Birtley, Robert, South Shields.
Boerman, Hendrik, Rotterdam, Holland.
Booker, Martin, Chester.
Borgen, Jennifer Averel, Fredrikstad, Norway.
Bosch, Fontcuberta, Luis Felix, Barcelona, Spain.
Bratton, Timothy James, Sidcup.
Brennan, Henry Joseph, Bolton.
Brown, Hartley Raymond, London.
Butler, Russell Trevor, Birkenhead.
Byfleet, Anne Patricia, Haxey.
Callaghan, Christopher Claude, Port Elizabeth, S. Africa.
Calonge Flores, Nieves, Berga, Spain.
Canas Carballido, Miguel, Madrid, Spain.
Carrillo Farnandez, Jose Angel, Barcelona, Spain.
Casseer, Noble Jenita, Nugegoda, Sri Lanka.
Catafau Riera, Jaime, Barcelona, Spain.
Cavagna, Sergio, Milan, Italy.
Chandraratna, Balasuriya Arachchilage, Wahakula, Sri Lanka.
Chown, Ronald, Lincoln.
Christoffersen, Brian Dudley, San Leandro, Cal., U.S.A.
Clarke, Kathleen Daphne, London.
Clarke, Nigel Kenneth, Marple Bridge.
Clayton, Keith M., Alfold.
Clements, Jennifer Margaret, London.
Cohen, Charles Stewart Sydney, London.

Colacicco, Lia Giovanna Lawton, Poole.
Collett, Jessica Mary, London.
Comin Vilajosana, Luis, Barcelona, Spain.
Cooke, David Orton, Hastings.
Cooper, Marjorie, South Elmsall.
Cooper, Malcolm David, Hoddesdon.
Costa Florit, Maria Luisa, Barcelona, Spain.
Coswatte, Bertie, Colombo, Sri Lanka.
Cowling, Denise Elizabeth, Northampton.
Crout, Stephen James, Wellington, New Zealand.
Cusco Ezquerra, Jose-Oriol, Barcelona, Spain.
Dayalji, Ghaghada Jayantilal, Wembley.
De Kock, H. M., Gouda, Holland.
De Rubeis, B., Nottingham.
Diaz Valcarcel, Maria Teresa, Barcelona, Spain.
Dick, Julie Ellen, Hastings, N. Z.
Diment, Paul Edwin, Battle Ground, Wash., U.S.A.
Diniz, David C., Hong Kong.
Dodson, John Sidney, Cobham.
Dominguez Mondelo, Segundo, Oviedo, Spain.
Doncel Corte, Jose, Oviedo, Spain.
Drost, Kristina R., Brummen, Holland.
Duckworth, Neil Frank, Bolton.
Duque Munoz, Marta Isabel, Madrid, Spain.
Edmunds, Sheila Margaret, Transvaal, S. Africa.
Edward, D. R., Colombo, Sri Lanka.
Egi, Shigeo, Tokyo, Japan.
Egi, Yoshi, Tokyo, Japan.
Eldridge, Maurice William, Sheffield.
Engelbrecht, Greta Anne, Pretoria, S. Africa.
Engelbrecht, Johann Pieter, Pretoria, S. Africa.
Engineer, Thrity P., Bombay, India.
Eno, Takatuko, Tokyo, Japan.
Escola Gabriel, Carina, San Cugat, Barcelona, Spain.
Evans, Karen Standish, East Horsley.
Evans, Linda Ann Elizabeth, Chester.
Evans, Mark, London.
Ewen, Edward Spence, Pinner.
Fabregat Sarro, Manuel, Barcelona, Spain.
Falomir Penarrocha, Amadeo, Liria, Valencia, Spain.
Faura Oriol, Regina, Barcelona, Spain.
Fenoll Hach-Ali, Purificacion, Granada, Spain.
Fernandez Goula Pfaff, Antonio, Barcelona, Spain.
Fernando, Bathiya Dhammika, Colombo, Sri Lanka.
Ferrandis Recatala, Juan Vicente, Valencia, Spain.
Ferrando Laric, Salvador, Valencia, Spain.
Fitzgerald, Leslie Edmund, Stanmore.
Fitzgerald, Patrick, Orpington.
Flewelling, Arthur Gary, Arthur, Canada.
Foster, Constance D., Sarasota, Fla, U.S.A.
Fotheringham, Noelle Anne, Johannesburg, S. Africa.
Freyer, Nina, Hong Kong.
Friedlaender, Lilly-Luise, Dusseldorf, W. Germany.
Fuentes Lopez, Jose Javier, La Coruña, Spain.
Gade, Fredrik Georg, Snaroya, Norway.
Gancedo Morera, Margarita, Barcelona, Spain.
Garcia Girones, Antonio, Barcelona, Spain.
Garcia Pilan, Alfonso, Albuixech, Valencia, Spain.
Garfat, Joe H., Peterborough, Canada.

Gausa Castro, Enrique, Barcelona, Spain.
Ghaswala, Sudhir R., Bombay, India.
Gifford, Thomas Leslie Noel, Alexandria, Va, U.S.A.
Goda, Motoyuki, Tokyo, Japan.
Godamanna, Thilak, Colombo, Sri Lanka.
Gonzalez Suarez, Maria Amparo, Gijon, Oviedo, Spain.
Goonatilake, Deepal, Colombo, Sri Lanka.
Goonawarna, C. L. W. P., Ratnapura, Sri Lanka.
Gorinsky, Peter Denis, Idar-Oberstein, W. Germany.
Goto, Midori, London.
Gould, Maurice Henry, Brunei.
Grant, William John Corrie, South Shields.
Grelick, Gary R., Buffalo, N. Y., U.S.A.
Grimbly, Margaret Susan, Plymouth.
Gunasekera, Aluthdura Anslem Winston Fernado, Kalutara, Sri Lanka.
Gunatilleke, G. A. E., Colombo, Sri Lanka.
Hacking, Peter Dennis, Accrington.
Hacquebord, Ronald Tjerk, Pretoria, S. Africa.
Haddy, H. J., Melville, W. Australia.
Hallauer, Rainer, Los Angeles, Cal., U.S.A.
Hallford, Dianna O., Hong Kong.
Hanni, Henry A., Basel, Switzerland.
Hansen, Lynette Carol, Johannesburg, S. Africa.
Harcourt-Wood, Ivan, Cape Town, S. Africa.
Hargreaves, Roy Compton, Sapphire, Australia.
Harris, Janet Elizabeth Anne, Adelaide, Australia.
Harris, Nancy Campbell, Bowie, Md, U.S.A.
Hatharasinghe, Swarnamali, Colombo, Sri Lanka.
Hayata, Yoshitoshi, Tokyo, Japan.
Hayes, Elizabeth Anne, Sheffield.
Henocq, James, South Croydon.
Henocq, Rosemary Shirley, South Croydon.
Hill, Orvin G., Malvern.
Hing, Tan Teong, Kuala Lumpur, Malaysia.
Holdroyd, Donna, Oslo, Norway.
Hori, Nagao, Tokyo, Japan.
Hornytzkij, Seppo, Helsinki, Finland.
Houghton, Linda Anne, Burnley.
Hoyos Guerrero, Miguel Angel, Madrid, Spain.
Huddlestone, Maria, Cape Town, S. Africa.
Hudspith, James Walter, Leatherhead.
Hughes, John Stanley, Reigate.
Hutson, Douglas Robert, Hornchurch.
Ikonen, Hilkka, Colombo, Sri Lanka.
Indra, Ratnasabapathy Maha, Colombo, Sri Lanka.
Indra, Srimevan Mohanraj Maha, Colombo, Sri Lanka.
Innes, Kenneth Raymond, Salisbury, Rhodesia.
Ip, Iau Tchum, Hong Kong.
Iqbal, Yath Mohamed, Colombo, Sri Lanka.
Ishak, Mohamed Mohideen Mohamed, Colombo, Sri Lanka.
Iyne, Tuan Fareeth, Colombo, Sri Lanka.
Jamous, Ezra Moise, Beirut, Lebanon.
Johnson, Frances Dorothea, Dallas, Tex., U.S.A.
Judez Martinez, Gregorio, Valencia, Spain.
Junquero Abellan, Ramon, Valencia, Spain.
Kandiah, Asokavathy Puivithavathy, Colombo, Sri Lanka.
Kavunanayake, Kodagoda Gam Acharige, Colombo, Sri Lanka.
Knowles-Brown, Andrew, Chesham.

Koivula, John Ilmarii, Seattle, Wash., U.S.A.
Koot, M. E., Schoonhoven, Holland.
Kothari, Navin, Jaipur, India.
Krol, James R., Troy, Mich., U.S.A.
Kull, Christian, Geneva, Switzerland.
Kull, Manfred W., Bonn, W. Germany.
Kume, Hiromao, Osaka, Japan.
Kuokkanen, Eune, Joensuu, Finland.
Kurata, Yukiko, Tokyo, Japan.
Langaard, Conrad, Hanau, W. Germany.
Lappalainen, Jorma, Lahti, Finland.
Lathpandura, Polgawage Don Gamini Gunasiri, Moratuloa, Sri Lanka.
Laurence, Carol May, Lourenço Marques, Mozambique.
Leach, Jane, London.
Lewis, Robert George, London.
Lezana Dominguez, Florentina, Barcelona, Spain.
Lezana Dominguez, Javier, Barcelona, Spain.
Lindstrom, Magnus, Stockholm, Sweden.
Lund, Gorm G., Oslo, Norway.
MacDonald, James Hartley, Herberton, Australia.
McLeod Gordon, Helen, London.
McRitchie Griffin, Bruce, Ashley Green.
Manchanayake, Sasanapala Kumaranatunga, Lunawila, Sri Lanka.
Manthregratna, Mallika Chandra, Mandawala, Sri Lanka.
Marchand, Hummer, Northampton, Mass., U.S.A.
Martinez Canales, Jaime, Barcelona, Spain.
Martinez Gamarra, Pilar, Barcelona, Spain.
Martorell Prat, Ramon, Barcelona, Spain.
Maryan, Mark, Northampton.
Mathiaparanam, Mathi Kumari, Colombo, Sri Lanka.
Mathiaparanam, Mathi Vathani, Colombo, Sri Lanka.
Mathiaparanam, Mailvaganam, Colombo, Sri Lanka.
Matsui, Reiko, Tokyo, Japan.
Mayling, Clifford George, Slough.
Mendis, Rowena, Colombo, Sri Lanka.
Miki, Kazuko, Osaka, Japan.
Mindry, Ernest Roy, Salisbury, Rhodesia.
Mitchell, Joyce Patricia, London.
Moline Sala, Agustin, Barcelona, Spain.
Moller, Peter John, Queensland, Australia.
Mollfulleda Buesa, Antonio, Barcelona, Spain.
Molten, Camille, Richmond, Va, U.S.A.
Montero Guerra, Ana Maria, Oviedo, Spain.
Montoliu Ferrer, Maria Carmen, Valencia, Spain.
Montserrat Nebot, Alfredo, Barcelona, Spain.
Mora, Carbonell, Antonio R., Valencia, Spain.
Moreno Garcia, Roberto, Madrid, Spain.
Moreno Humet, Luis, Barcelona, Spain.
Moses, Heather, London.
Munell Casini, Juan, Barcelona, Spain.
Murga Chivite, Miguel Angel, Lerida, Spain.
Nandalal, Ranasinghe Liyanage Upali, Angoda, Sri Lanka.
Naotunna, Ananda Sirisena, Kelaniya, Sri Lanka.
Narangoda, Shanaka, Ratnupura, Sri Lanka.
Nazeer, Mohamed Hussain Mohamed, Colombo, Sri Lanka.

Nightingale, Graham Jeffrey, Manchester.
Nisbet, Alistair Scott, Salisbury, Rhodesia.
Noor Deen, Mohamed, Colombo, Sri Lanka.
Nootenboom, Winnie Lee-Bing, Hong Kong.
Oliveiro, Esther Paola Marguerite, Curacao, Holland.
Olsen, Ole, Wimbourne.
O'Neil, Robert Lincoln, Brisbane, Australia.
Orford, Carl Victor, Broadstairs.
Oria, Albero, Isabel J., Valencia, Spain.
Oria Albero, Maria Paz, Valencia, Spain.
Osawa, Yukihiro, Tokyo, Japan.
Oyaguez Martinez, Domingo, Madrid, Spain.
Paddock, Orlando S., Dallas, Tex., U.S.A.
Padro Vers, Ramon, Manresa, Barcelona, Spain.
Palencia Fernandez, Carlos, Madrid, Spain.
Paulin, Per Philip Elon, Uppsala, Sweden.
Paulsen, Marie, Oslo, Norway.
Peace, Reginald Jewitt, Beverley.
Pedemonte Gonzalez, Maria Dolores, Barcelona, Spain.
Perceval, Gregor C., Fremont, Cal., U.S.A.
Perera, Ambagapathirige Mervyn Terrence, Panadura, Sri Lanka.
Perera, Nihal Kirihi Marinus, Hendela, Sri Lanka.
Perry, Charles John, Marple.
Phillips, Ian, Nottingham.
Pickering, Horace Ensor, Burton-on-Trent.
Pilley, Brian, London.
Pino Panades, Jose, Barcelona, Spain.
Pitigala, Chandra Rohan Wasanthakumar, Angoda, Sri Lanka.
Piyasundara, Pitigala Kankanange, Pelawatte, Sri Lanka.
Poel, Melvin Christopher, Solihull.
Pozas Ashton, Carlos, Barcelona, Spain.
Prat Moya, Maria Sagrado C., Barcelona, Spain.
Prickett, John Davidson, Auckland, New Zealand.
Puerta Semprum, Carmen Dela, Madrid, Spain.
Puiggali Fabregas, Jose Maria, Barcelona, Spain.
Punchihewa, Ranjith Susantha, Nugegoda, Sri Lanka.
Purushottam, Zaveri Rupesh, Bombay, India.
Quaak, E. P., Kraggenburg, Holland.
Rademaker, Elizabeth Johanna, Soest, Holland.
Rae, John Allan, Hong Kong.
Ralston, Jonathon Barry, London.
Ramalingham, A. S., Kandy, Sri Lanka.
Ramchandran, K. T., Bombay, India.
Ramos Rodriguez, Pedro, Madrid, Spain.
Ranasinghe, Mahesha, Yogoyans, Sri Lanka.
Ratmalana, Arthur, Sri Lanka.
Read, John Vernon, Transvaal, S. Africa.
Richards, Nancy Ann, New Brunswick, Canada.
Rimmer, Robert James, Southport.
Ripley, Evelyn, Stockton.
Robertson, Valerie Patricia, Sheffield.
Rodes Sole, Maria Dolores, Barcelona, Spain.
Rodrigo, Warnakulasuriya Richard Felix, Colombo, Sri Lanka.
Rodriguez Rodriguez, Julio C., Gijon, Oviedo, Spain.
Rooms, Paul Anthony, Florence, Italy.
Roye, Ann, Bolton.

Ruiz Roca, Jose Vicente, Valencia, Spain.
Samarajeewa, Janakanamda, Mt Lavinia, Sri Lanka.
San Juan Ribes, Antonio, Valencia, Spain.
Santamaria Zaragoza, Santos, Barcelona, Spain.
Sant'Angelo, Louis, Harum, Malta.
Sanz de Madrid Munagorri, Maria Victoria, Barcelona, Spain.
Sarna, Rajesh, Nairobi, Kenya.
Satoh, Ryuich, Tokyo, Japan.
Schinkel, Anthony, Southport.
Senaratne, Senajii Gayanta, Kandy, Sri Lanka.
Sepp, Arne, Cape Town, S. Africa.
Serra Viladomiu, Elvira, Berga, Barcelona, Spain.
Seyferth, M., Schoonhoven, Holland.
Shimada, Kazuto, Chiba, Japan.
Shimoda, Hisako, Yokohama, Japan.
Silva, Senaka Wimalanath, Katana, Sri Lanka.
Simon, Horace, Shreveport, La, U.S.A.
Sivanathan, Ramana, Colombo, Sri Lanka.
Sliker, Lawrence Spencer, Esslingen. W. Germany,
Smedley, Lynne, Burton-on-Trent.
Smith, Andrew Martin, Halifax.
Smith, Joseph William, Mississauga, Canada.
Smith, Ronald, Nottingham.
Sprinkle, Thomas W., Wilmington, O., U.S.A.
Staver, John, Virginia, Minn., U.S.A.
Stead, Raymond, Huddersfield.
Steward, Sheila Dickson, Hong Kong.
Stone-Houghton, Christopher, Portsmouth.
Storr, Jonathan, Lincoln.
Styrevik, Anne Gro, Oslo, Norway.
Sugatadasa, Karunasenaliyanage Dayananda, Colombo, Sri Lanka.
Suren, Jane Lucienne Linzee, London
Suriyawansa, Priyanthi Nerupamal De Silva, Galle, Sri Lanka.
Suzuki, Yusaku, Tokyo, Japan.
Tanner, Eileen Mary, Amersham.
Tarre Noguer, Isabel Del, Barcelona, Spain.
Taylor, Jonathan Laurence, Bristol.
Thomas, E. C. A., Ormskirk
Thompson, Ronald A., Toronto, Canada.
Thomson, Paul Ronald, Tasmania, Australia.
Tillekeratne, Gcekiyanage D. S. P. R., Nugegoda, Sri Lanka.
Tong, Tan Chin, Kuala Lumpur, Malaysia.
Towne, Kenneth Alan, Crawley.
Tsui, Lung Hing James, Hong Kong.
Tsujikawa, Kayoko, Hyogo, Japan.
Tubella, Carlos Llurba, Reus, Tarragona, Spain.
Turner, Paul John, Norwich.
Turuoka, Eiko, Saitama-Ken, Japan.
Tyebally, Happy Hebtulabhoy, London.
Uasanthakumar, Aloysious Francis, Negombo, Sri Lanka.
Udabage, Dhanapala, Nugegoda, Sri Lanka.
Ueno, Yukie, Tokyo, Japan.
Upasena, Suyani Damayanthie, Kelaniya, Sri Lanka.
Valls Fontanals, Jose-Oriol, Barcelona, Spain.
Van Den Bosch, Glynis Mary, Transvaal, S. Africa.
Van Den Hoven, A. N., Ede, Holland.
Van Der Meulen, Anne, London.
Vargas Perez, Manuel de, Barcelona, Spain.
Vazquez Alfaro, Manuel, Alboraya, Valencia, Spain.
Verkerk, R., Stolwyk, Holland.
Vila Perales, Vicente, Barcelona, Spain.

Vivo Ibanez, Jose, Barcelona, Spain.
Wagenaar, Philip, Heiloo, Holland.
Watanabe, Michihisa, Shizuoka, Japan.
Waylett, Andrew John, Maidstone.
Webb, Thomas Hampton, Linville, N. C., U.S.A.
Weerasuriya, Manora, Nugegoda, Sri Lanka.
Wells, Marilyn, Mt Edgecombe, Natal, S. Africa.
Wheeler, Lesley, Lymington.
Wheeler, Malcolm John, Chigwell.
White, Alison Rhodes, Leeds.
Wick, Edwin, Plantation, Fla, U.S.A.
Wiik, Irene, Oslo, Norway.
Wijesinghe, Kantha, Colombo, Sri Lanka.
Wijesuriya, Ananda, Mt Lavinia, Sri Lanka.
Wijeyekoon, Anthony Nalin Gemunu, Colombo, Sri Lanka.
Wijeyekoon, Mallika, Colombo, Sri Lanka.
Winston, Harry, Durban, S. Africa.
Woolf, Felicity Gay, Sandton, S. Africa.
Yamamoto, Kemichi, Yokohama, Japan.
Yamana, H., Tokyo, Japan.
Zacher, Martin Paul, Crawley.
Zoppi, Marco, Flims-Dorf, Switzerland.

COUNCIL MEETING

At a meeting of the Council of the Association held on Monday, 6th October, 1975, the Council agreed to accept the "Rules of Application for the Diamond Trade", drawn up by CIBJO (Confédération Internationale de Bijouterie, Joaillerie et Orfèvrerie), which is the international organization for the jewellery trade in Europe, and these Rules will be observed in the Association's Courses and Examination Syllabuses.

At the same meeting the following were elected to membership:

Fellowship

Blasi Casal, Juan, Barcelona, Spain. D. 1974
Borgen, Per Otto, Krakeray, Norway. D. 1962
Canals Cadafalch, Montserrat, Barcelona, Spain. D. 1974
Carbonell Pujol, Rafael, Barcelona, Spain. D. 1972
Chantara, Kem, London. D. 1973
Costa Ramon, Maria, Llis de Vall, Spain. D. 1974
Crawley, Annette, Liverpool. D. 1975
Esquerra-Torrescasana Llobet, Jose, Barcelona, Spain. D. 1973
Gonzalez Gimenez, Anastasio, Barcelona, Spain. D. 1974
Majo Llopart, Miguel, Barcelona, Spain. D. 1974
Read, Peter George, London. D. 1975
Sidoli, Julien, London. D. 1959
Sweeting, Penny, London. D. 1975
Warr, David A., Gloucester. D. 1975

Transfers from Ordinary Membership to Fellowship

Ahmad, Masud, London.
Bartoli, Anne Marie, Gex, France.
Benjamin, John C., Wembley Park.
Bootz-Verbunt, E. H. H., Hilversum, Holland.
Brauns, Sandra M., Hong Kong.
Bredebusch, E., Hong Kong.
Brooks, Ferriel M., Hong Kong.
Burr, Kevin F., Guildford.

Capell, Elaine, Port Elizabeth, S. Africa.
Clapperton, Elizabeth Morag, Aberdeen.
Cornelius, Richard A., London.
Diniz, David C., Kowloon, Hong Kong.
Dissanayake, Jayasinghe M. E., Hounslow West.
Freeman, Michael John, Enfield.
Frowein, Carl R., Stellenbosch, S. Africa.
Haddy, Helen J., Melville, W. Australia.
Harris, Janet E. A., Adelaide, S. Australia.
Hewitt, Leonard E., Lincoln.
Holness, Malcolm H., Effingham.
Horder, Heather A., Windsor.
Houghton, J. A., London.
Hughes, Charles J., St. John's, Nfd, Canada.
Hummel, Frank A., Weiser, Ida., U.S.A.
Imai, Takayasu, London.
Javeri, Kishan, Kobe, Japan.
Kennedy, Esther I., Charlotte, N.C., U.S.A.
Langaard, Conrad, Hanau/Main, W. Germany.
Leslie, Catherine E., Hong Kong.
Leyser, Gerarda S. M., Arnhem, Holland.
Logsdon, Maxon A., Wethersfield, Conn., U.S.A.
Lowe, Peter E., Windhoek, S. W. Africa.
Maurer, Robert J., Brentwood.
Miller, Charles R., Southfield, Mich., U.S.A.
Miller, Wilda, Lynwood, S. Africa.
Obiols Mundet, Agustin, Barcelona, Spain.
Paul, Anne C., Hong Kong.
Paulin, Per Philip E., Uppsala, Sweden.
Petersen, Graeme E., Lower Hutt, New Zealand.
Rappitt, Toby James, Maidenhead.
Rossetti, Luigi, Idar-Oberstein, W. Germany.
Round, Anthony W. R., Epsom.
Scavia, Fulvio, Milan, Italy.
Shida, Junko, Yokohama-City, Japan.
Stanford, Paul Lewis, St Peter Port, C. I.
Strachan, Anne R. N., Hong Kong.
Sze, Richard Y. M., São Paulo, Brazil.
Teske, Jan, Lisse, Holland.
Tester, Robert E., Gibraltar.
Tolmie, Nigel L., Stonnall.
Van, Ann-Catrin, Hong Kong.
Williams, Jack D., Philadelphia, Pa, U.S.A.
Wisdom, Terence R., Chorley Wood.
Yano, Kiyoko, Kobe, Japan.
Young, Martin J. P., Aberdeen.
Zoppi, Marco, Flims-Dorf, Switzerland.

Ordinary

Adamally, Duraiya, Wellawatte, Colombo, Sri Lanka.
Alwani, Ramesh T., Beirut, Lebanon.
Arakawa, Yasuko, Tokyo, Japan.
Arooz, Abdul S. M., Kowloon, Hong Kong.
Aspinall, Paul, Bebington.
Bailey, Paul S., Corsham.
Bar-Isaac, Charles, Rehovot, Israel.
Bell, Howard, Hanover, Ont., Canada.
Beria, Sandor, Cannes, France.
Boaz, Jhansi R., Colombo, Sri Lanka.
Bosisio, Pier Franco, Bergamo, Italy.
Bower, John C., Penfield Gardens, S. Australia.

Brokie, E. A., Fort Frances, Ont., Canada.
Brookhuis, Harry, Lekkerkerk, Holland.
Brown, John Stanley, Seaham.
Buckley, Graham F. J., Shanklin.
Butler, Russell T., Birkenhead.
Campbell, Jane D., Edinburgh.
Cavey, Christopher R., London.
Chalmers, Allan, Salisbury, Rhodesia.
Chan Chun-Chung, Caleb, Kowloon, Hong Kong.
Chang, He Ok Rio de Janeiro, Brazil.
Cohen, Ronald D., Wilmington, Del., U.S.A.
Corbaz, Jean-Pierre, Lausanne, Switzerland.
Crawford, Hugh B., Kirkcudbright.
De Koning, Bernhard, The Hague, Holland.
De Silva, Denise M. A., Colombo, Sri Lanka.
Dembinski, Frank J., Watertown, Mass., U.S.A.
Devereux, Maureen, Hong Kong.
Dharmadasa, Sooriya H. M. J., Colombo, Sri Lanka.
Diament, Marie, Gatineau Ste-Foy, Que., Canada.
Dick, Julie E., Hastings, New Zealand.
Edmunds, Sheila M., Johannesburg, S. Africa.
Ensell, Anthony R., Bexhill-on-Sea.
Esbin, Howard B., Montreal, Que., Canada.
Farnham, Julian R., Haslemere.
Fernando, Ungamandadige F. C. S., Panadura, Sri Lanka.
Forbes, W. Victor, Cocoa Beach, Fla, U.S.A.
Fu, Christine, Hanau/Main, W. Germany.
Fukunaga, Yasuo, Kobe, Japan.
Furuya, Masashi, Yamanashi-Ken, Japan.
Genge, Geoffrey L., Southland, New Zealand.
Gifford, Thomas L. N., Alexandria, Va, U.S.A.
Giles, Cynthia J., Hong Kong.
Goto, Kou, Kobe, Japan.
Greer, Alvin E., Dhahran, Saudi Arabia.
Griffiths, C. M., Lusaka, Zambia.
Hamilton, Sheilah E., Hong Kong.
Harel, Ben Zion, Ramat Gan, Israel.
Harre, Hendrik, Schoten, Belgium.
Heesen, Charlotte, Schoonhoven, Holland.
Hemphill, Craig Lee, Pacific Grove, Cal., U.S.A.
Hemphill, Sheri T., Pacific Grove, Cal., U.S.A.
Herdman, Ann, Hexham.
Higuma, Teruo, Tokyo, Japan.
Hikai, Hiroshi, Kobe, Japan.
Hirani, Abdul A. N., Karachi, Pakistan.
Hoskins, Tonja R., Mobile, Ala., U.S.A.
Huang, Hsing Yun, Singapore.
Idenburg, Gerbrig M. C., Schoonhoven, Holland.
Iguchi, Mitsuo, Kobe, Japan.
Iijima, Akira, Kobe, Japan.
Inada, Kazuhiro, Habikino-City, Japan.
Ishikawa, Makoto, Fukuoka City, Japan.
Jager, Lynette M., Brisbane, Australia.
Jinadasa, Sybil T., Colombo, Sri Lanka.
Jusab Memon, Noor Mohamed, Kowloon, Hong Kong.
Kapukotuwa, Senerath L. B., Rajagiriya, Sri Lanka.
Katada, Rie, Tokyo, Japan.
Katsurada, Mitsue, Tokyo, Japan.
Kaufman, Norbert, Didcot.
Kawase, Kazuichi, Ibaragi-Ken, Japan.

Kenneford, Vera E., Tonbridge.
King, Marie C., Seattle, Wash., U.S.A.
Kizawa, Masakatsu, Amsterdam, Holland.
Ivin, Crawford R., Barnet.
Knapp, Clifford D., Markham, Ont., Canada.
Knedler, Karin E., Lower Hutt, New Zealand.
Knight, Marie-Jose, s'Gravenhage, Holland.
Ko Yiu-Kong, Dennis, Hong Kong.
Koetter, Marshina H. M., Cape Town, S. Africa.
Kosugi, Hajime, Yokohama, Japan.
Kotagama, Leslie S., Harlow.
Krasner, Harold, Johannesburg, S. Africa.
Kull, Manfred W., Birkenfeld, W. Germany.
Kumpulainen, Kalevi M., Helsinki, Finland.
Lacy, Ronald, Otford.
Lam Cham Hing, Harry, Hong Kong.
Lattes, Mauro, Geneva, Switzerland.
Lincoln, Dennis J., Cape Town, S. Africa.
Lindau, Georg, Jnr, Munich, W. Germany.
Lloyd Allingham, G. G., Burlington, Ont., Canada.
London, Phil, Melrose Park, Pa, U.S.A.
Lu, Milton Ren-Kuan, Taipei, Taiwan.
Madanayake, Upalj G., Colombo, Sri Lanka.
Maeda, Susumu, Yokohama-City, Japan.
Mahendrarajah, Maureen, Colombo, Sri Lanka.
Maricar, Mohamed S. A. J., London.
Martin, David D., Wellington, New Zealand.
Matsuo, Kouki, Kobe, Japan.
Mendis, Harold G. S., Panawala Eheliya Goda, Sri Lanka.
Mercado, Brian R., Braamfontein, S. Africa
Miller, Duncan E., Cape Town, S. Africa.
Miura, Yoshiyuki, Kobe, Japan.
Moate, George R., Bromley.
Mori, Asako, Kobe, Japan.
Muije, Lillian E., Louisville, Ky, U.S.A.
Munarriz, Blanca, Madrid, Spain.
Myer, Richard D., Auckland, New Zealand.
Nachimson-Palacci Rosy, Geneva, Switzerland.
Nakajima, Noriatsu, Kobe, Japan.
Nakao, Eiichi, Kobe, Japan.
Nassau, Kurt, Bernardsville, N. J., U.S.A.
Nishtar, Abdul M. A., Colombo, Sri Lanka.
Noormohamed, Mohamed R., London.
O'Donoghue, Mary E., Brooklyn, N. Y., U.S.A.
Okamoto, Yuji, Kobe, Japan.
Okumura, Kennosuke, Nishinomiya-shi, Japan.
Okuzumi, Hiromi, Tokyo, Japan.
Oliver, Peter J., Wellington, New Zealand.
O'Neal, Elizabeth A., Portland, Oreg., U.S.A.
Onishi, Fumio, Tokyo, Japan.
Onnink, Jannie A. P., Barendrecht, Holland.
Otsu, Takanori, Tokyo, Japan.
Ou, Alice Hin Eng, Singapore.
Ouno, Haruyo, Kobe, Japan.
Ouno, Noboru, Kobe, Japan.
Paillard, Eva, Paris, France.
Palmieri, Donald A., Pittsburgh, Pa, U.S.A.
Patterson, Mark S., Merion Station, Pa, U.S.A.
Pidoux, Phyllis J., Willowdale, Ont., Canada.
Po, Samuel Ka Keung, Kowloon, Hong Kong.

Potter, Michael Ross, Solihull.
Rae, John Allan, Kowloon, Hong Kong.
Ramalingam, A. S., Kandy, Sri Lanka.
Ratwatte, Anil Tyronne, Colombo, Sri Lanka.
Robertson, Susan Margaret, Wellington, New Zealand.
Robinson, Kenneth W., Milton Keynes.
Rowe, Kathleen E., Torquay.
Rundle, Frank A., Hobart, Tasmania.
Sakaguchi, Teiji, Yokohama, Japan.
Sakai, Hachiro, Kobe, Japan.
Schmulian, Jack V., Johannesburg, S. Africa.
Schreuders, Hendrik, Craighall, Tvl, S. Africa.
Selvarajah, Kulaveerasingam, Dehiwela, Sri Lanka.
Senanayake, Daya R., Colombo, Sri Lanka.
Shaika, Leela, London.
Shaikh, Nasseruddin, London.
Shamsett Vasu S., Poona, India.
Simon, Samuel J., Colombo, Sri Lanka.
Sivalingam, Kandiah, Colombo, Sri Lanka.
Smith, Mickey, Philadelphia, Pa, U.S.A.
Smith, Robert J. O., B.F.P.O. 5, Nee Soon.
Spaeti, Susanna, Lucerne, Switzerland.
Steacy, Harold R., Ottawa, Ont., Canada.
Stevens, Marion, Maroubra, Australia.
Takahashi, Kunishige, Kobe, Japan.
Takigawa, Junko, Kyoto-City, Japan.
Talgeri, Jayshree G., Poona, India.
Tamagaki, Satoru, Kobe, Japan.
Taya, Shojiro, Kobe, Japan.
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Van Dissel, S. M., Schoonhoven, Holland.
Van Kerrebrouck, Alex, Antwerp, Belgium.
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Van Waadenoyen Kernekamp, Madelon H. M., Schoonhoven, Holland.
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Yamajo, Shuichi, Kanagawa Pref., Japan.

Yamazaki, Midori, Tokyo, Japan.
Yonekura, Eiko, Toyonaka-shi, Japan.
Yu-Yun Yue, Monica, Taipei, Taiwan.
Zdanowicz, Stanislaus, Warsaw, Poland.

GEM DIAMOND EXAMINATION 1976

The Association's post-diploma examination in Gem Diamonds will be held on 7th and 8th June in London and in Birmingham.

Prospective candidates for the examination should apply to the Association's Registrar for an entry form in January and the final enrolment date is 1st March, 1976.

Candidates are reminded that they should have passed the Association's Diploma examination before applying for the Gem Diamond examination.

CORRIGENDA

In J. Gemm., 1975, XIV, 8—

(1) on p. 364, sixth line from bottom of page, for "a sample current of 0·15 Ma" read "a sample current of 0·15μA":
(2) on p. 395, sixth and seventh lines from bottom of page, for "Antique fashioning of gemstones" read "Antique gemstone vessels":
(3) on p. 396, fifteenth line from bottom of page, for "the art of writing on them" read "the powers ascribed to them".

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