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GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN
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THE LAST MILL ON THE IDARBACH

By KENNETH BLAKEMORE

THE cutting industry, that has made the twin towns of Idar-Oberstein famous since Roman times, grew up on the banks of two little streams, tributaries of the Nahe. The most important of these two streams was the Idarbach. The other was the Fischbach. Records from 1450 tell that in those days there were twenty mills on the banks of the Idarbach, where the agate, amethyst, citrine and jasper, found in the hills that rise from its banks, were cut and polished. The waters of the stream were held up by sluices and released down mill-races to spin the mill wheels that in turn rotated the huge sandstone grinding wheels inside the mills. To-day there is only one of these mills left on the banks of the Idarbach. This mill is maintained mainly as a tourist attraction, but agates and many other ornamental stones are still cut there.

The mill looks much as the mills of medieval times must have done—a low tiled shed built of stone with a big wooden wheel on one side of it. The only change that the passing centuries have brought has been that inside the mill shelves have been built above the great sandstone wheels. These were put there to hold labelled specimens to interest the visitors. Also on a bracket attached to one of the pillars, that support the roof, an unusual alms dish has been placed. Visitors can now drop an appreciative coin or two into a section of a large geode filled with fine dark amethyst crystals.

The foundation of the cutting industry on the Idarbach goes back to Roman times. The Romans, in the course of building a road to serve their fortress at Trier, found agates on the rolling green hills above the winding river Nahe, some thirty miles to the north of where the city of Saarbrucken now stands. Previously the Romans had obtained the agates, which they used for cutting as cameos, from around Arcates in Sicily, the town which is said to have given its name to the agate. The Roman invaders of Germany discovered that the agates from the hills around the Nahe were superior to those of Sicily, and set up an industry there, the products of which were sent back to Rome.

The agate deposits around Idar-Oberstein must have been substantial. The grinding wheels in the mills along the banks of the river were kept turning continually until the nineteenth century. Eventually, however, there were no more worthwhile agates to be found. The craftsmen of Idar-Oberstein were thrown out of work.

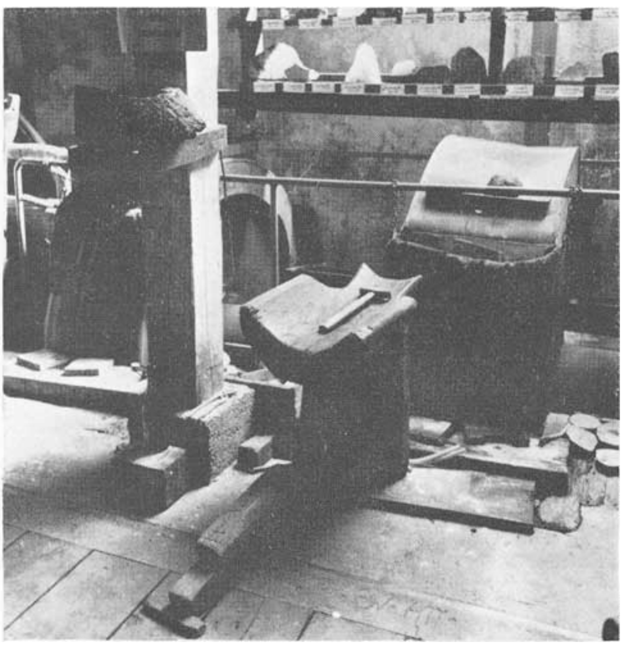
There is a romantic story that the idle agate cutters formed a choir, and that the choir became world famous. In the course of a tour the choir found itself in Brazil, and one day walking up the

The last mill on the Idarbach.

road to the hacienda of a rich Brazilian ranch owner, they saw that the road they were walking down was paved with agate.

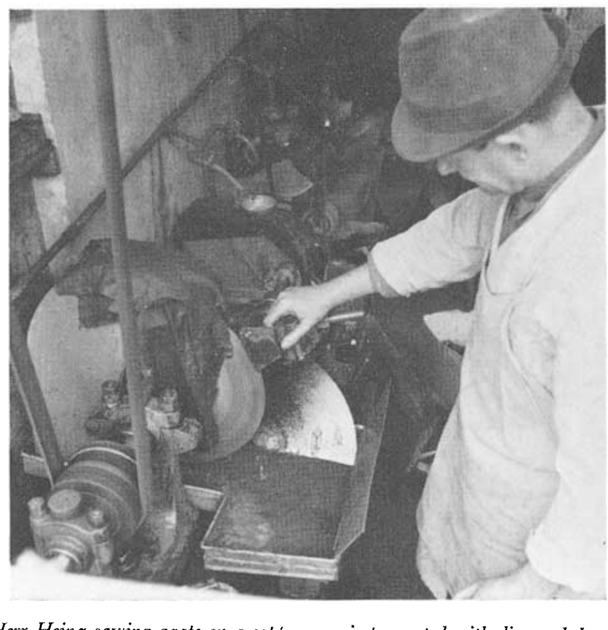
Whether this story is strictly true, it was certainly the agates and the other gem material imported from Brazil that started the mill wheels of Idar-Oberstein turning again. The bad years in the nineteenth century closed many of the mills however. The introduction of electricity to the industry closed the rest, replacing them with modern workshops, which subsequently diversified into faceting diamonds, coloured stones and synthetics. Only one mill was preserved, dependent still on the power of water.

When I visited this mill in the Spring, the little Idarbach was in spate after a week of rain. Even so this winding stream, overhung with willows and alders, seemed hardly adequate to have powered an important industry, but the tiny torrent that bubbled through the mill-race was turning the mill wheel merrily round and round, while inside the mill the three grinding wheels, six feet in



The saddle on which the cutter lies to hold the agates against the sandstone grinding wheels. Above the wheel shelves have been erected to hold specimens of interest to visitors. On a bracket a section of a geode is used as an alms dish.

The cutter lies over the saddle holding the agate against the sandstone wheel.



Herr Heinz sawing agate on a copper saw impregnated with diamond dust.

diameter and two feet thick, were rotating steadily. In these days, when we have so many other sources of power at our disposal, we tend to underestimate the power of water.

The owner of the mill to-day is Herr Heinz. The only thing that differentiates him from the rest of the workers is that he wears a white coat, and the others who work along side him wear drab grey overalls. Herr Heinz's job is to saw the stones into slabs and blocks, using a rotating copper disc impregnated with diamond dust. There is a tang of petrol in the air in the mill because petrol is used as a coolant for the saws. The job that Herr Heinz does is the only one that has been modernized. Before the invention of the diamond-impregnated saw, some eighty years ago, the agates were cleaved into sections with a hammer and chisel.

The "cutting" is done in the same way that it has been done for countless centuries. The cutter lies on a "saddle", a curved stool secured to the floor, supporting his feet on a small beam nailed to the floor boards. The position in which the cutters work is, I found, surprisingly comfortable, as it must obviously be when you think about it, because the men lie like this all day, pressing the agates against the V-shaped face of the sandstone wheels. The grinding wheels are cooled incidentally by running in a trough of water.

A smaller wheel is used for polishing the agate, and the green polishing compound (a chromic oxide) splatters over the workers' hands and clothes.

Not only agates are cut in this mill, but many other decorative stones. I saw rhodonite, jasper and crocidolite from Africa, lapis-lazuli from Chile and nephrite from North America being cut while I was there. The products of the mill vary from the giant agate and rhodonite ashtrays that abound in the offices and homes of Idar-Oberstein, to little specimens for collectors. These one can buy for a mark or two each in the town of Idar-Oberstein.

SYNTHETIC COBALT BERYL

By A. M. TAYLOR, Ph.D., F.G.A.

AN intriguing red-coloured synthetic beryl containing cobalt shows promise as a new gemstone. It is one of the many exotic beryls recently produced hydrothermally and doped with elements of the first transition series. Crystals containing V (green), Mn (greyish-green), Co (pinkish-brown), and Ni (light-green) were first grown by the Russian workers Emel'yanova *et al.*, [1] and the O-ray absorption spectra reported in 1965. These beryls, as well as ones containing Fe (deep-blue) and Cu (light-blue) have been made by the author in Melbourne, Victoria. The cobalt beryl exhibits such startling optical properties that its exploitation as a gemstone seems quite probable.

The attractiveness of this somewhat odd reddish-coloured beryl lies in its unique dichroism. The colour ranges from light-brown to a rich purple for the O and E-ray, respectively. A stone cut with its table parallel to the optic axial plane appears an amber colour from above, but increasingly reddish when viewed from the side. The best red colour is obtained when the table is orientated parallel to the optic axis. Unfortunately, the rich purple of the E-ray can only be fully appreciated with the aid of a polaroid sheet or dichroscope, since otherwise even at best it is blended at equal strength with the pale brown O-ray.

With the Chelsea filter, cobalt beryl provides a beautiful example of what might be called the "traffic-light effect", if the two vibration directions are viewed separately. The O and E-ray appear respectively green and bright red through the filter. A similar effect, but much weaker (green and pink) is exhibited by deeply coloured vanadium emerald[2]. The Chelsea filter is a dichromatic type, transmitting light in two narrow bands, in the deep red near 6900Å and in the yellow-green near 5700Å. The purple E-ray has a strong absorption band in the 5700Å region, thus it appears red through the filter, as do blue cobalt spinel and glass. On the other hand, the brown O-ray transmits light about equally well in both regions and so appears greenish, as the filter transmits more yellow-green than red light.

The absorption spectra of cobalt and other synthetic beryls are being studied at the C.S.I.R.O. using a Beckman DK-2 spectrophotometer over the range 0·3 to 3 μ. For gemmological purposes, only the cobalt beryl absorption in the visible will be presented here. The absorption band positions listed below were measured with a Beck reversion spectroscope, and are mean values of numerous readings on four crystals.

O-RAY			E-RAY		
A	5612Å	weak	A	5860Å	strong
B	5447Å	weak	B	5670Å	strong
C	5256Å	weak	C	5430Å	strong
D	4475Å	strong	D	not detectable	

Measurements reproducible within ±10Å.

The absorption spectra are illustrated in Fig. 1 as seen through a prism-type spectroscope. The startling dichroism is due to the markedly dissimilar nature of the O and E-ray absorption spectra. The brown O-ray has a strong absorption band in the violet and only a weak, hazy triplet group absorption in the green. The purple E-ray, in contrast, freely transmits all the violet, and exhibits to the fullest extent the characteristic cobalt absorption pattern of three

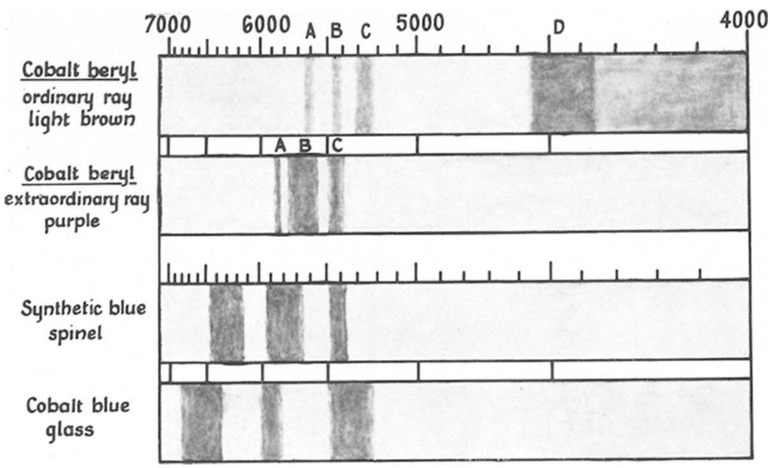


Fig. 1

very intense bands, with the central band being widest, all closely bunched up in the yellow-green part of the spectrum.

The two main factors influencing the position and intensity of absorption bands in substances are:

(*a*) Valence state of the absorbing metal ion.

(*b*) Number of anions (usually 4, 6 or 8) that surround this metal ion and effectively bond with it.

The "sameness" of the familiar chromium absorption spectrum in different gemstones is the result of it nearly always being due to Cr^{3+} substituting for Al^{3+} in sixfold co-ordination with oxygen ions (octahedral sites). Likewise, the three strong absorption bands signifying cobalt in blue synthetic spinel and glass (see Fig. 1) are due to Co^{2+} in fourfold co-ordination with oxygen ions (tetrahedral sites)(3).

The beryl structure $Be_3.Al_2.Si_6O_{18}$, has Be^{2+} and Si^{4+} in tetrahedral sites and Al^{3+} in octahedral sites. Beryl coloured by cobalt could theoretically contain either, or both Co^{2+} and Co^{3+}, located in tetrahedral or octahedral sites. However, the reducing nature of the hydrothermal growth media favours the existence of divalent cobalt in solution. In general, compounds having Co^{2+} in tetrahedral sites are blue in colour, whereas those with it in octahedral sites are pink (e.g. MgO), due to an overall shift of the absorption bands to shorter wavelengths. Thus we may tentatively attribute the cobalt beryl absorption spectrum to divalent cobalt substituting for aluminium in the octahedral sites of the beryl structure. Charge balance could be maintained in various ways, such as by addition of alkali ions in the large, open, channel positions that occur within the Si_6O_{18} hexagonal rings.

The question "Does cobalt beryl occur in nature?" can safely be answered by saying that so far none has been found. Staatz *et al.*(4), who recently published spectrographic analyses of 47 beryl specimens from a range of environments, were able to detect cobalt in three specimens, but only at the 0·0003% level, whereas 0·1% or more would be required to give a reasonable depth of colour. In fact, coloured cobalt minerals are few in number, the most notable being the rose erythrite or cobalt bloom, a hydrated arsenate usually found in the oxidized portions of cobalt ore deposits; pink cobalti-calcite sometimes used in lapidary work; and the deep blue lusakite, a cobaltoan staurolite (up to 8% CoO) found in Northern Rhodesia.

With the increasing production of new synthetic crystals in various laboratories around the world, it is inevitable that some of the more attractive ones are fashioned into gemstones by lapidaries who happen to be on the spot. Usually these exotic gems are confined to private collections, but when they do occasionally get into free circulation they often cause much confusion because their physical properties are not widely known (e.g. synthetic garnets).

Cobalt beryl now has the advantage of a prior introduction, so that any chance encounter in the trade, will I hope, result in favourable interest rather than suspicion. Its refractive indices (1·565-1·575) and specific gravity (2·67-2·69) are the same as for synthetic vanadium emerald[2]. Some confusion is perhaps possible with tourmaline due to its strong dichroism, however the traffic-light effect with the Chelsea filter and distinctive cobalt absorption spectrum will readily serve to identify it, leastways, that is until someone produces cobalt tourmaline.

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3. A. P. Nikolaev, S. V. Grum-Grzhimailo, A. N. Men' and V. I. Cherepanov. *Soviet Physics—Crystallography*, vol. 11, 1967.
4. M. H. Staatz, W. R. Griffiths and P. R. Bennett. *Am. Mineralogist*, October 1965.

THE WORLD'S LARGEST TAAFFEITE?

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

MOST gemmologists know the piquant story of the late Count Taaffe who in 1945, working with only a low-powered microscope, was greatly puzzled by a 1·42 carat pale mauve "spinel" which showed visible double refraction. The strange nature of the stone was confirmed by Mr. B. W. Anderson, and, after further tests by Dr. G. F. Claringbull and Dr. M. Hey of the Natural History Museum, it was found to be a new mineral and named taaffeite after the discoverer.

A further specimen weighing 0·86 carats was found in 1949 by Mr. C. J. Payne, and yet another, weighing 0·84 carats, in 1957 by Robert Crowningshield, of the Gemological Institute of America.

In June this year the story was told again, in a column by George A. Bruce, in the American magazine *Modern Jeweller*. This article inspired a reader to check his own collection of spinels and resulted in the discovery of a fourth taaffeite weighing 5·34 carats. Mr. Bruce reports that this is a purple cushion-cut stone from Ceylon and that it has been confirmed by Richard Liddicoat of the G.I.A. Laboratory. Its density is 3·608 and is reported as having refractive indices 1·720-1·724. These indices are slightly higher than those for the earlier stones which have been encountered.

Further details are not yet available but there seems little doubt that this is by far the largest known faceted taaffeite. A brief report of crystals of the mineral being found in China was dealt with in this Journal earlier this year, by B. W. Anderson,[1] but it seems unlikely that these have been cut, or that they are necessarily of this size or even of gem quality.

1. Anderson, B. W. *Crystals of taaffeite found in China.* Journ. of Gemmology., (1967), 10, 5, p. 148.

MORE ABOUT SYNTHETIC GARNETS

By R. WEBSTER

FOLLOWING the report by R. K. Mitchell (*Journ. Gemmology*, January, 1967) on the find of a synthetic chromium-neodymium doped yttrium aluminium garnet (Y.A.G.) in a commercial stone parcel, the writer records his observations on some other specimens of synthetic yttrium aluminium garnets and of a yttrium iron garnet (Y.I.G.), which have been produced in England and which he has had the opportunity to examine.

The first is a specimen of colourless yttrium aluminium garnet consisting of a piece of crystal, which in form resembled part of a Verneuil-process boule. The section was hexagonal in outline. These synthetic garnets are not grown by the Verneuil technique, but by the "pulling" technique devised by Czochralski.

The weight of the specimen was 25·18 carats and was found to have a density of 4·562. The hardness was found to be about 6, for it was readily scratched by quartz and doubtfully by feldspar (orthoclase). The refractive index and dispersion values must await until a suitable prism of the material is cut and polished, so that measurements may be made by the method of minimum deviation. There was no pronounced absorption spectrum observed although very faint traces of the didymium rare earth lines were noticed. The specimen did not appear to show any major internal features, but between "crossed polars" there was some anomalous double refraction, and along the long axis of the specimen this anomalous double refraction took the form of a pseudo-uniaxial interference figure.

The response to long-wave ultra-violet radiation was a distinct whiteish glow and a similar, but much weaker, glow was seen when the short-wave ultra-violet lamp was used. Under x-rays the stone showed a bright violet glow but, strange for a synthetic stone, showed no phosphorescence. When viewed between "crossed filters" the stone showed a red residual colour—possibly by transmission of the white glow through the red filter. No fluorescence spectrum was seen and there was no electro-conductivity shown.

A small colourless crystal showing a few crystal faces, which was most probably grown from a flux-melt production, gave some anomalous results, for the small stone which weighed only 0·232 carats was found to have a density as low as 4·043. No absorption spectrum was visible using a hand-spectroscope. Examined microscopically the surface was seen to have growth marks in hexagonal arrangement and internally a liquid-filled feather was observed. The stone showed a bright yellow-green fluorescence under both wavelengths of ultra-violet light. A very similar glow with persistent phosphorescence of the same colour was observed when the stone was bombarded with x-rays and after this treatment the stone was found to have photo-coloured to a yellow. The stone did not exhibit any electro-conductivity.

Another small colourless crystal, also showing a few crystal faces, showed strongly the characteristic didymium rare earth absorption spectrum. This stone was found to have a density of 4·6 and was not visibly fluorescent under ultra-violet light, but showed a strong yellow-green with some phosphorescence when bombarded with x-rays. Examination of the interior showed the specimen to contain groups of crystal inclusions. There was no electro-conductivity.

Since Mitchell's report on the green synthetic Y.A.G. garnet, which was undoubtedly "doped" with both chromium and neodymium and/or praseodymium, two brilliant-cut stones recently examined were "doped" with chromium only.

The larger stone weighing 1·605 carats was found to have a density of 4·63, while the smaller stone which weighed 0·527 carats was found to have a density of 4·74. Examined microscopically the smaller stone was seen to have a few drop-like inclusions and faint "mixing" inhomogeneities rather like "treacle". In the larger stone some radial structures were apparent when the stone was viewed between "crossed polars". The main difference between these stones and the stone reported upon by Mitchell lies in the absorption spectrum. These two stones showed no sign of the didymium rare earth lines but showed an exceptionally striking chromium-type absorption spectrum. This consisted of a weak band centred about 7000Å and about 80 angstroms broad; a sharp line at 6870Å and a strong broad absorption band with two "peaks" centred at 6780Å and 6700Å. These were followed by a weak continuum ending at about 6300Å.

Under long-wave ultra-violet light these stones showed an orange-red to crimson glow, and emitted a crimson glow under the short-wave lamp. In neither case was any phosphorescence observed. Under x-rays the stones showed a strong crimson glow and exhibited a strong and persistent phosphorescence. Agreeing with the stone examined by Mitchell these two stones, when bathed in a beam of strong white light, showed strong red gleams, a similar effect to that seen in the Linde synthetic emeralds. No electro-conductivity was observed in these two stones.

The yttrium iron garnet (Y.I.G.) examined weighed 47·83 carats. It was opaque black and showed two flat faces where it had either been sawn or had grown up against flat surfaces. The rest of the stone had lustrous crystal faces. The density was determined as 5·997 and the stone was found to be strongly magnetic but showed no magnetic polarity. No electroconductivity could be discerned. From the crystal faces present it may be inferred that the crystal was grown by the flux-melt method and not by the Czochralski "pulling" technique. Such Y.I.G. crystals are grown as an insulating magnetic material for use in lasers, light modulators, micro-wave resonating media, and in ultrasonic devices. They have little value as a gemstone.

It is clear that more of these synthetic garnets will be met in the future, for not only are yttrium iron garnets and yttrium aluminium garnets being produced, but gallium and germanium garnets have been grown. "Doped" with a number of transition elements all sorts of colours may be expected and indeed pinks mauves, yellows, and blues have already been reported.

AN IMPROVED DESIGN OF STONE TONGS

By B. F. MARTIN, M.D., B.Sc., F.G.A.

NOT all are gifted with manual skill, but even very skilled gemmologists are well aware of the hazards of handling gemstones and small crystals with a pair of stone tongs—also called corn tongs, forceps or tweezers. No less an authority than Mr. B. W. Anderson[(1)] confesses them difficult to manage, and his views regarding their qualities and management are echoed here.

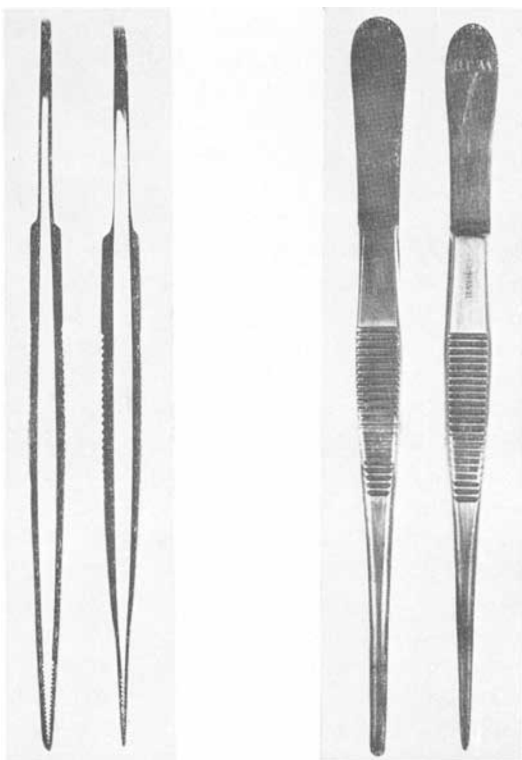
All too often, a gemstone will spring out of the tongs, sometimes to a surprising distance, and much valuable time is spent, sometimes fruitlessly, in searching bench and floor, including the crevices. After many such annoying episodes, it occurred to the author that the current design of tongs is not conducive to the safe handling of gemstones. The tongs in use are instruments of general utility and find service in a wide variety of trades and professions. Gemmologists use both the rounded and the sharp-pointed varieties and the latter are perhaps the more hazardous to employ.

In designing a pair of tongs for the special purpose of handling gemstones, the author arrived at the following conclusions: (1) they should be lightly sprung, so that the pressure exerted on the stone can be gauged and kept light, (2) the ends should be so fashioned that even small stones can be viewed easily and (3) the pattern of grooving on the inner faces of the ends should minimize the tendency of the stone to slip, and this is perhaps the most important consideration of all.

In the standard tongs, the ends have a series of transverse grooves on their inner faces and thus a poor grip is obtained on a stone unless the tongs approach it vertically and take the girdle between opposite grooves. In practice, however, the tongs are usually held obliquely or horizontally, the latter approach being the more desirable, especially if the stone is to be transferred to the polariscope or refractometer. With a trap-cut stone the girdle cannot now enter the grooves and very little of it (if any) with one of brilliant-cut, so that the highly polished stone, which has little friction, is virtually held between smooth steel faces and if it is at all askew it springs from the tongs. It seemed therefore, that if longitudinal grooves were added to the existing transverse set, to produce a cross-hatched effect, there should be a good chance of the girdle entering grooves in almost any position it may be grasped.

After a successful trial in refashioning an old pair of mild steel tongs, an even better result was obtained with a stainless steel pair, using a standard "Rayner" 5 inch tongs, with rounded ends. Because of the hardness of stainless steel, much of the fashioning was undertaken with carborundum and sandstone wheels. Final fashioning was by miniature file and a high polish was obtained with finer grades of emery paper, followed by burnishing. Comparison of the refashioned with the standard tongs is shown in side view in Fig. 1 and in face view in Fig. 2.

In side view (Fig. 1) it is seen that the two segments of the spring portion are considerably thinned, especially in their middle



FIGS. 1 and 2. *Comparison is shown between the standard and the refashioned tongs in side view in Fig. 1 and in face view in Fig. 2. The refashioned are the lower pair in both Figs. (4/5th natural size).*

regions. This is achieved by removing metal from their outer surfaces and repeatedly testing the spring power during grinding until it is sufficiently light to satisfy the operator.

The ends of the tongs are reduced by removing metal from their sides as well as their outer surfaces, for a distance of about $\frac{7}{8}$th of an inch. Metal is removed from their outer surfaces until they are very thin and have been bevelled to a narrow edge, the bevelling being particularly fine at the tips. The ends are then straightened a little until they are almost parallel. This results in a somewhat "crocodile" appearance, as shown in Fig. 1. Although it is clearly unnecessary to work to micrometer measurements, it was found in the pair illustrated that the thickness of their ends had been reduced from approximately 60 to 40 thousandths of an inch, i.e. by about one third. As the ends are being thinned, their sides should be gradually reduced and brought to a slight taper as shown in Fig. 2, paying particular attention to the tips which should be elliptical in outline. Although the width diminishes gradually towards the tips, measurement of the pair illustrated showed that near the centre of the grooved area they had been reduced from about 140 to 100 thousandths of an inch, i.e. by about one third.

The last operation before polishing is to cut three longitudinal grooves, very carefully, across the existing transverse set on the inner faces, using a miniature triangular file. A central groove is cut first and then one to each side of it.

The author has found that with such refashioned tongs it is easy to gauge the pressure applied to the stone, a good view is obtained, even of very small stones, since there is little metal to obscure them and they seldom spring from the tongs. In fact, a slight click is often heard a few moments after taking up a stone, indicating that it had started to slip but found its place in a groove. To diminish further the chance of slipping, the stone should be taken up with the tongs parallel to the bench and gently manoeuvered with the opposite thumb and finger until the girdle enters the longitudinal grooves and is felt to be locked in position.

Although fashioning of the tongs entails some hours of labour, the undertaking may be considered as that "stitch in time" which could well save many more hours from waste in the future and perhaps save some valuable stones.

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Gemmological Abstracts

LIDDICOAT (R. T.). *Developments and highlights of the Gem Trade Laboratory, Los Angeles.* Gems and Gemology, 1967, XII, 4 and 5, pp. 118-124, 146-156.

Among items encountered at the Laboratory were flux-grown rubies and emeralds with unusual types of inclusions. Synthetic fluorite, heavily doped with lanthanium, had a density of 4·89 and a refractive index of 1·47. A cyclotron-treated marquise-cut diamond showed two parallel lines, one on each side of the "keel" and not the "umbrella". There is mention of irradiated cultured (Biwa) pearls and similarly treated topaz. In the latter, owing to the low refractive indices, the original material was presumed to be blue topaz, which had turned to a sherry-brown colour by the treatment. A number of unusual stones were also examined including a cerrusite and a kornerupine cat's-eye. A natural legrandite, a hydrated zinc aresenate, transparent and bright yellow in colour, was identified. Flux-grown synthetic gahnite spinel and synthetic greenockite were also encountered. R.W.

CROWNINGSHIELD (R.). *Developments and highlights at the Gem Trade Laboratory, New York.* Gems and Gemology, 1967, XII, 4 and 5, pp. 110-117, 137-145.

Commercially sold rough synthetic rubies were found to have "seeded" crystals. A strontium titanate, which had been sold as a "diamond", shattered when being reset. Identification hazards are illustrated by one case where reflections from curved lines in a synthetic sapphire caused the appearance of "silk". Angular twinning was also seen in a synthetic ruby. R.W.

LIDDICOAT (R. T.). *Diamond proportion grading and the new proportion-scope.* Gems and Gemology, 1967, XII, 5, pp. 130-136.

The new instrument, devised by the Gemological Institute of America, enables the measurement of the proportions of unmounted cut diamonds. It is a modification of the profilometer now commonly used in industry, and has a screen suitably graduated for diamond measurements. R.W.

MESSCHAERT (G. W.). *The stone carvers of Kofu, Japan.* Gems and Gemology, 1967, XII, 4, pp. 103-109.

The materials used for carving at the Kofu centre are mainly imported into Japan. The tools and methods of carving are described.

R.W.

AXON (G. V.). *The gemstones of America.* Australian Gemmologist, 1967, 71, pp. 5-6.

A short review of the gemstones found in the U.S.A. The use of anthracite (coal) to make small carvings, and ulexite (television stone), which is able to transmit pictures along the length of the fibrous crystals, are mentioned.

R.W.

WHITWORTH (H. F.). *Amethyst from Onslow, W. Australia.* Australian Gemmologist, 1956, 73, p. 7.

Amethyst has recently been found in the Onslow district of Western Australia. In colour the smaller crystals are a rich purple and the larger ones appear almost black. The tips of the crystals are free from inclusions and gems could be cut from them.

R.W.

BOOK NOTICES

CHOATE (S.). *Creative Casting.* Allen & Unwin, 1966. 50s.

TAYLOR (G.). *Continental gold and silver.* Michael Joseph (Connoisseur monograph), 1967. 25s.

BENDA (K.). *Ornament and jewellery.* Paul Hamyln, 1967. 63s.
This book describes the distinctive Slav contribution to the art of jewellery in the early middle ages.

Ausgesuchte mineralien. Excellent minerals. F. Harrach, Bad Kreuznach.
A folder containing 9 colour photographs of minerals.

ARGENZIO (V.). *The fascination of diamonds.* Allen & Unwin, London, 1957. 30s.

A British edition of an excellent account of diamond, which was first published in 1966. (Journ. Gemmology, 1966, 10, 3, p. 108).

ASSOCIATION NOTICES

EXAMINATIONS IN GEMMOLOGY, 1967

In the 1967 examinations in gemmology organized by the Gemmological Association of Great Britain, 376 candidates sat for the preliminary examination and 196 for the diploma. Centres were again established in many parts of the world and the number of entries for both examinations was the highest in the history of the Association.

Upon the recommendation of the examiners the Tully Memorial Medal and Rayner Prize have been awarded to Miss Elizabeth Strack of Idar-Oberstein, W. Germany.

The Rayner Prize in the preliminary examination has not been awarded, as those who submitted the best papers were not eligible for the award.

The following is a list of successful candidates, arranged alphabetically:—

Diploma Examination

Tully Memorial Medal

Elizabeth Strack, Idar-Oberstein, W. Germany.

Qualified with Distinction

Arps, Charles Edward Samuel, Oegstgeest, Holland
Bodes, Reginald, Voorburg, Holland
Dudek, Clelan Francis, Oregon, U.S.A.
Harding, James Norman, Northwood Hills
Hayes, Lillian Eveline, London
Hopkins, Norman Barton, Bowie, M.D., U.S.A.
Jones, Sylvia Margaret, London
Renfrey, Eric, Ormskirk
Rickenberg, Robert Edwin, Los Angeles, U.S.A.
Strack, Elizabeth, Idar-Oberstein, W. Germany
Trenholme, Russell Shannon, Tokyo, Japan

Qualified

Arbeid, Martin Jolis, London
Astley-Sparke, Jeremy Peter, London
Baugerod, Gunnar, Porsgrunn, Norway
Beaman, Ronald David Birmingham,
Beck, Cyril Anthony, Manchester
Bennett, Peter John, Enfield
Benthall, Richard Pringle, Walton-on-the-Hill
Berwick, Keith James, Portsmouth

Blacklock, Ralph Ellis Macrae, Sunderland
Bodenham, John Edward, Birmingham
Borrmann, Bjorn, Fjellhamar, Norway
Bosch, Hilmar Dirks, Salisbury, Rhodesia
Bowers, Norman, Manchester
Bowley, Malcolm Anthony, Bukuru, N. Nigeria, W. Africa
Brown, Janet Irene, Congleton
Brown, Judith Audrey, Altrincham
Buchanan, Alistair McKenzie, Edinburgh
Buchanan, Kenneth Ray, Tulsa, Oklahoma, U.S.A.
Bull, Rudolf, Sorengo, Switzerland
Bytheway, Keith Leonard, Walsall
Chartier, Henri Paul, Esher
Cherns, Jack Jacob, London
Clifford, Geoffrey Roy, Maidstone
Collier, Alan, Burscough, Nr. Ormskirk
Cowbourne, Elizabeth Mary, Bingley
Croydon, Robert William, Norwich
Cuss, Christopher Jude, London
Cutts, Michael James, Surbiton
D'Arcy, Michael Stephen, Peterborough
Doughty, Mary Forbes, Birkenhead
Earnest, Robert Allan, Santa Monica, California, U.S.A.
Edrisinghe, Barbara, Colombo, Ceylon
Evans, Royston Thomas, Altrincham
Foster, Angela, Liverpool
Franks, Ivor Selwyn, London
Frost, Frank Roger, Oxford
Fuller, Robert George, London
Gardiner, John Clive, Manchester
Gay, Alan Leslie, Birmingham
Gay, Phillip G., S. Miami, Florida, U.S.A.
Gillon, Mary, Glasgow
Goodman, Brian John, Hammerwich, Nr. Walsall
Gregory, David George, Liverpool
Hamnett, Norman, Radcliffe
Hartley, Donald Wilson, E. Detroit, U.S.A.
Hartmann, Carolus Johannes, Dentlaag, Holland
Hemsworth, John Alan, Manchester
Johnson, Cyril Alan, Rugby
Kwok-Leung, George Chan, Kowloon, Hong Kong
Levy, Marion David, Atlanta, Georgia, U.S.A.
Linares, Robert C., Ridgefield, Conn., U.S.A.
Lorimer, Barry Anthony, Cross Roads, Nr. Keighley
McLachlan, Catherine, Boksburg, Tvl., S. Africa
McTeigue, Walter J., New York, U.S.A.
Mechlin, Wilmer, Chevy Chase, M.D., U.S.A.
Mendis, Cynthia Marguerite, Colombo, Ceylon
Mumford, Ronald Broughton, Sunningdale
Nash, Geoffrey Edwin, Walsall
Neary, Geoffrey, Huddersfield
Newham, Frank Edward, London
Newman, Brian Anthony, Cape Town, S. Africa
Nixon, Rolf Thorp, Washington, U.S.A.
Ozolins, Nikolajs, Sao Paulo, Brazil
Parkes, Frederick, Stanmore
Perera, Dixon Chandrasiri, Minuwangoda, Ceylon
Porter, Graham Stanley C., Birmingham
Priestman, Arthur, Manchester
Rees, Dietlinde Maria Augusta, London
Russell, Madeleine, Ilford
Sanderson, Clare, Romford
Sasaki, Edwin, Tokyo, Japan
Schnieden, Harold, Bramhall
Spohn, Winfried, Cologne, Germany
Stokes, Timothy David, Birmingham

Sutton, Robert Michael, Bramley, Nr. Guildford
Swain, Marilyn Janice, London
Talbot, Peter Ernest, Crayford
Warren, Philip Arthur, Hest Bank, Nr. Lancaster
Wilson, Geoffrey Alexander, Urmston, Nr. Manchester

Preliminary Examination
Qualified

Abril, Emilio Armengol, Barcelona, Spain
Alabaster, A. Paul, Moseley (Birmingham)
Altermatt, Edgar Curtiss, Berkeley, California, U.S.A.
Arps, Charles Edward Samuel, Oegstgeest, Holland
Ash, Stephen Leslie, Exeter
Balaguer, Agustin Avila, Barcelona, Spain
Ball, Norman Douglas, Sherborne
Banner, L. B., Kings Norton (Birmingham)
Barreda, Lorenzo Prats, Barcelona, Spain
Barrenger, Jonathan, Weybridge
Bartolo, Cynthia Milvaine, Salisbury, Rhodesia
Bayley, Lyndon John Elsmore, Edgbaston (Birmingham)
Beaumont, Roy Anthony, Market Harborough
Beechey-Newman, Hansel J. A., Falmouth
Benbrook, Alan David, Dagenham
Benthall, Richard Pringle, Walton-on-the-Hill
Berlin, Ronald, London
Beynon, Michael John, Bassaleg (Mon).
Bibby, Rachel Ann, London
Bird, Anthony Thomas, Cardiff
Bird, Thomas John Rees, Llandaff, Nr. Cardiff
Birkinshaw, David William, Robin Hood, Nr. Wakefield
Bisbee, Juan Domenech, Barcelona, Spain
Blacklock, Ralph Ellis Macrae, Sunderland
Blackwell, Alan, Barnehurst
Blockley, Doreen Sandra, Stockport
Blowfield, Ian Stewart, Pinner
Bodes, Reginald, Voorburg, Holland
Bond, Ian Norman, Whangarei, N. Island, N. Zealand
Borque, Felix Valtuena, Barcelona, Spain
Bos, E. G. G., Amsterdam, Holland
Bowley, Malcolm Anthony, Bukuru, N. Nigeria, W. Africa
Brady, Deanna Mary, Birkenhead
Bryant, William, Seymour, Texas, U.S.A.
Bryk, Raymond Alexander, London
Buckingham, Robert George, Witney (Oxon).
Burnham, Norah Elsie, Birmingham
Butler, Barry, Sheffield
Butler, Terence Eustace, Balogna, Italy
Canto, Jaime Sancho, Barcelona, Spain
Capdevila, Juan Vilalta, Barcelona, Spain
Carr, Malcolm, Addington
Carry, Michael R., Manchester
Chapman, Ernest James, Torquay
Chapman, Robert, London
Collin, Alan Arthur, Chester
Connard, John Martin, Southport
Considine, M., Shipley
Coulson, Maurice, Sunderland
Covent, Richard Jeffery, Toronto, Canada
Crawford, Brian Henry, Cape Town, S. Africa

Cros, Adolfo Traveria,
Barcelona, Spain
Danby, John, Leeds
Davis, Jack, London
Derges, Leonard Frederick, Paignton
De Silva, Koththagoda Kankanange
Danujapala, Colombo, Ceylon
De Souza, Victor Joao, Kobe, Japan
De Vroomen, L. J. M., London
Dickenson, Henny, Salisbury,
Rhodesia
Dickman, George Stokes,
Haverfordwest
Dingle, Patricia N., Cooksville,
Ontario, Canada
Domenech, Tomas Turrents,
Barcelona, Spain
Dot, Eduardo Bruquetas,
Barcelona, Spain
Dring, Jacqueline Anne, Langrick,
Nr. Boston
Dunthorne, Robert Percival,
Stroud (Glos).
Earnest, Robert Allen, Santa
Monica, California, U.S.A.
Egea, Anthony, London
Eriksen, Einar Aas, Trondheim,
Norway
Evans, Michael Stanley,
Weston-Super-Mare
Felisart, Francisco Arla,
Barcelona, Spain
Felisart, Ramon Arla, Barcelona,
Spain
Fieldhouse, John Ernest, Sutton
Coldfield
Fischer, Marianne E., Stellenbosch,
S. Africa
Flory, Ian, Dundee
Gastager, Max, Bad Reichenhall,
W. Germany
Gaylor, John, Loughton
Giesskann, Paul Walter, London
Gimenez, Pedro Sendon, Barcelona,
Spain
Goodson, David Lloyd, Tettenhall
Gosling, James Granville, Coulsdon
Grimminger, Alfred, Frankfurt/Main,
Germany
Greenlees, Roger Martyn, Bolton
Gull, Peter, Bloxwich (Walsall)
Gunn, John Francis, Hornchurch
Harper, Peter Johnathan, Sutton
Coldfield
Hayes, Bernard, Liverpool
Hayes, Brian, Sheffield
Heriz-Smith, Nicholas Peter, London
Hester, David Charles, Gt. Missenden
Hilliger, Harold Arthur, Leaven
Worth, Kansas, U.S.A.
Hitchen, Melvin, Stanley,
Nr. Wakefield
Holden, Terence, St. Helens
Holmes, Graham John,
Bexhill-on-Sea
Holroyd, Philip, Frodham (Cheshire)
Hopkins, Norman Barton, Bowie,
M.D., U.S.A.
Horsfall, Robert Rodgers,
Andamooka, S. Australia
Houghton, Coralyn Diana,
Bolton-Le-Sands, Nr. Carnforth
Huguet, Joaquin Solans,
Barcelona, Spain
Hulme, Elizabeth, London
Hung, Lau, Hong Kong
Huston, Jane Elizabeth Claire,
Groomsport, Co. Down
Hutchins, Andrew John Francis,
Remuera, Auckland, New Zealand
Jackson, Colin William, Darlington
Jackson, P. J. R., Rudgwick
Jenkins, James Alexander,
Monaghan, Eire
Jones, Carole A., Newton-Le-
Willows (Lancs).
Jones, Diane Roberta, Salisbury,
Rhodesia
Jones, Stephen Richard,
Stockton-on-Tees
Jordaan, Barend Daniel,
Stellenbosch, S. Africa
Karpovitch, Stephanie Sophia,
New York, U.S.A.
Karslen, Britta, Oslo, Norway

Kjendlie, Karl Magnus, Oslo, Norway
Lane, Stuart Howard, Bideford
Ledbetter, Susan, Dublin, Eire
Lewis, Dqvid Trevor Keyes, Borrowash (Derbyshire)
Lewis, Lawrence, London
Lewis, Richard, London
Ligaard, Anne-Britt, Oslo, Norway
Lluch, Jose Pladellorens, Barcelona, Spain
Lopez, Bartolome Montoro, Barcelona, Spain
Lyons, Leslie, Blackpool
MacLeod, Dan Murdoch, Baden Baden, W. Germany
Marsden, David Norman, Blackburn
Masterman, Gillian Elizabeth, Gerrards Cross
Matsuzaki, Shigeru, Tokyo, Japan
Mayr, Ute, London
McAleese, David A., Toronto, Canada
McLachlan, Catherine, Boksburg, Tvl., S. Africa
McNeilly, Sheila, Belfast
Meagher, G. V., Islington, Ontario, Canada
Mercer, Ian Frederick, Romford
Messias, Marvin, Stanmore
Metcalfe, Alan, Lancaster
Metcalfe, David, Lancaster
Michel, Gerard Armand, Beunos Aires, Argentina
Millar, David Moore, Napier, Hawkes Bay, New Zealand
Millington, Grenville Arthur, Smethwick (Staffs).
Milton, Geoffrey Seymour, Liverpool
Milton, Mark Seymour, Liverpool
Mitchell, Frank Richard, Frampton-on-Severn (Glos).
Moen, Anthony Peter Michael, Stellenbosch, S. Africa
Mollet, Federico Estrada, Barcelona, Spain
Moore, James Laurence, Wallasey (Cheshire)
Mordaunt, John Forsyth, Buxton
Morgan, Deryck, Pontypridd
Morrow, Roger Anthony, Rixton, Nr. Warrintong
Mosey, Irene, Lancaster
Muir, Philip Louden, Wilmslow
Nadelhofer, Hans, Burgdorf, Switzerland
Neal, Jennifer Joanna, Balsall Common, Nr. Coventry
Nidd, David Robert, Sutton Coldfield
Nussbaum, Eric E., Geneva, Switzerland
O'Donoghue, Michael John, London
Pairman, Gordon Sinclair, Leven (Fife).
Pardoe, Paul Roger, Worthing
Pass, John, Haslington, Nr. Crewe
Peddie, Thomas Donald, Leven (Fife).
Peters, Anthony Gayton, Exeter
Peyerl, Wolfgang, Johannesburg, S. Africa
Pichon, Jean-Daniel, Geneva, Switzerland
Piederiet, J. J. M., Breda, Holland
Pilley, Brian, London
Pitt, Robert, Sutton Coldfield
Pragnell, Jeremy Martin, Stratford-on-Avon
Prigg, Leonard Ernest, Cardiff
Purchon, Eric, Bradford
Pye, George Anthony, Kings Winford (Staffs).
Raisin, Daniel, Geneva, Switzerland
Raphael, Beyda, Geneva, Switzerland
Ravenscroft, Jean, Wirral
Reilly, Hugh Joseph, Burntisland (Fife).
Richards, Avril, London
Rio, Carlos Moreno Del, Barcelona, Spain
Ripoll, Miguel Moncada, Barcelona, Spain
Roy, William Dick, Leven (Fife).
Ruiz, Carlos Baguena, Barcelona, Spain

Sadler, David A., Ayr
Santasusagna, Ramon Nicolau, Barcelona, Spain
Sasaki, Edwin, Tokyo, Japan
Schnetz, John V. P., Kriens, Switzerland
Silcock, James Barry, Southport
Sluis, Bastiaan, Vlaardingen, Holland
Smith, Charles Rubin, Selfridge AFB, Michigan, U.S.A.
Smith, William Alexander, Salisbury, Rhodesia
Smyth, John Joseph, Dublin, Eire
Staatsen, Albertus Claudius, Utrecht, Holland
Stadelmann, Fritz, Schaffhausen, Switzerland
Stafford, Margaret Nairn, Glasgow
Start, John Michael, London
Steib, Fred, Chicago, U.S.A.
Stewart, Christopher R., Bournemouth
Stone, Walter, Bronx, New York, U.S.A.
Stringer, Paul, Wirral
Sundal, Svein, Oslo, Norway
Sunde, Otto Georg, Oslo, Norway
Swindellis, Lorna, Salisbury, Rhodesia
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Williams, Richard Gordon, Weybridge
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Woodcock, Peter Hamilton, Pendleton (Salford)
Woodhill, John Eric, Sittingbourne
Wooldridge, Beryl, Bere Alston, Nr. Yelverton
Wright, William Anthony, Potters Bar
Zelley, Howard Douglas, Norwich

GIFTS TO THE ASSOCIATION

The Association is indebted to Capt. J. Sinkankas, California, for a collection of N. American gem minerals.

A set of polaroid photographs for teaching purposes has been kindly sent by John Fuhrbach, of Amarillo, Texas, U.S.A.

A specimen of milky star-quartz, found in Norway, from Per Chr. Sæbø, Oslo.

OBITUARY

THOROLD G. JONES of Abingdon, August 1967. (D.1926).

From the late nineteen twenties until 1950 (apart from the war years), Thorold Jones guided and encouraged many student gemmologists when he was assistant to Mr. I. Jardine and later Mr. B. W. Anderson, in the gemmology classes held at Chelsea. At that time his work at the Geological Survey and Museum at Piccadilly and later at South Kensington, was a great help to him in fostering the study of gemmology. After the war he transferred to the Atomic Energy Authority at Harwell, where he was employed at the time of his death. His painstaking efforts helped many gemmological students to master the techniques of the microsope and refractometer and to develop a keen eye for identifying stones by using only a hand-lens. He will be remembered with affection by many who qualified in their examinations from the gemmological classes at Chelsea Polytechnic.

* * *

Winnert, George, of Loughborough, 16th June, 1967. (Diploma 1949).

COUNCIL MEETING

At a meeting of the Council of the Association held on 12th July, 1967, the following were elected to membership:—

FELLOWSHIP

Stocker, Christobel Mary, (Miss), Guildford, Surrey. D.1965

ORDINARY MEMBERSHIP

Ansell, Leslie S., Loudwater, Herts.
Bedingfield, Roger Anthony, London, N.W.1
Belfield-Smith, C., New Delhi, India
Bosworth, John Charles, Salisbury, Rhodesia
Calvert, Leonard Silverwood, Brough, E. Yorks.
Cheng, H. C. (Dr.), Kowloon, Hong Kong
Crawford, Leslie Raymond, Pforzheim, W. Germany

Dickenson, Marvin G., Walnut Creek, Calif, U.S.A.
Harral, Benjamin David, Cawthorne, Yorks.
Jobbins, Edward Allan, London
Kocyk, George, New York, N.Y., U.S.A.
Kohn, Anthony, West Islip, New York, U.S.A.
Kris, Panjabi Kamlesh, Bunkyo-Ku, Tokyo
Lauer, Merle B., Johnstown, Pa., U.S.A.
Logan, Cecil Corbett Malcolm, Harewood End, Hereford
Manser, Anthony Richards, Southampton, Hants.
Memon, Yakub Jusab, London, S.W.9
Merson, Leonard Arnold, Ealing, London, W.5
Nalliah, Selliah, Colombo
Norman, Boris A., London, S.W.19
Pollard, John Desmond, Dinsdale, Hamilton, New Zealand
Schubnel, Henri-Jean, Paris, France
Schupp, Heinz, Pforzheim, W. Germany
Shatha, Mohamed Thaha Mohamed, Beruwala, Ceylon
Sparshott, Joan Amelia (Mrs.), Hayling Island, Hants.
Thompson, William, Pendeen, Penzance, Cornwall
Walsh, Henry Standley, Coulsdon, Surrey
Wolfenden, William A. R., Truro, Cornwall

PROBATIONARY MEMBERSHIP

Asami, Yukiko (Miss), Cambridge
Harding, Jeremy Lance, Copthorne, Sussex
Quincey, Peter John, London, E.C.1
Roberts, Lesley A. (Miss), Wallasey, Ches.
Zarobabely, Aron, Tehran, Iran

GEM DIAMOND EXAMINATION

In the 1967 Gem Diamond Examination held by the Association there were 23 entries, and the following is an alphabetical list of successful candidates.

Qualified with distinction: Gabriel June Doherty-Bullock, Worcester

Qualified:

Berry, William, Leicester
Blanshard, Philip John, West Wickham
Boroszak, John Kasmick, Blackpool
Clarke, Hilary Anne, Hampstead, London, N.W.3
Clough, Michael Bernard, Bolton
Coop, Norah Marian, Barnes, London, S.W.13
Crank, Susan Elizabeth, Bolton
Gaydon, Julie Hazel, Surbiton
Kirkpatrick, Maurice Robert, Kenilworth
Leese, Peter Francis, Northwood
McKay, Robin Ian, Thames Ditton
Miller, Elizabeth Anne, Wolverhampton
Mole, Christopher John, Blackheath, Birmingham
Moore, Martin C., Birmingham
Petzall, Ossi George, Ilford
Porter, Maurice John, Paddington, London, W.2
Selvon, Dennis Ralph, Woodford Green
Smith, David John, Hove
Stern, Evelyne, Wembley Park
Weller, Raymond John, Croydon

MEMBERS' MEETINGS

During a brief summer visit to the U.K. Capt. John Sinkankas, of San Diego, California, U.S.A., kindly gave a talk to members at the Medical Society of London's Hall, Chandos Street, London, W.1, on 27th June, 1967. Capt. Sinkankas spoke about various gem localities in North America and, with the aid of many interesting coloured illustrations, described various localities from Ontario, Canada, to California, U.S.A. The fact that Capt. Sinkankas had visited the localities described, made the talk intensely interesting. Capt. Sinkankas gave a detailed account of the occurrence of many gems at the various sites and charmed his audience not only by the extent of his knowledge but also by many humorous asides. The Association is indebted to him for an excellent talk.

Mr. B. W. Anderson, in his introduction to the meeting, described Capt. Sinkankas as a first class lapidary and the author of two books which had made a splendid contribution to gemmological literature. A vote of thanks was proposed by Mr. Robert Webster, who expressed appreciation of the information that had been given.

MIDLANDS BRANCH

The summer outing of the Midlands Branch of the Association took place on 9th July, 1967, when members visited the Blue John Mines at Castleton, Derbyshire. Afterwards a visit was made to Chatsworth House, the Home of the Duke of Devonshire. On the return journey dinner was taken at the White Hart Hotel, Uttoxeter.

JOURNAL OF GEMMOLOGY

The following back numbers of the *Journal of Gemmology* are required:—

Vol. 1. Nos. 3 and 4

Vol. 2. No. 2

Vol. 3. Nos. 1 and 3

Please send details to the Secretary of the Association.

JOURNAL OF GEMMOLOGY VOLUME 10

Nos. 1 - 8

1966 - 1967

Names of authors are printed in small capitals, subjects in lower case

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