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IN THIS ISSUE

On the Cover

Lovely Barbara Stanwyck wears Robert Taylor's gift of diamond-encrusted gardenias suspended from a slender platinum chain with matching earrings. Designed and made by Ruser of Beverly Hills, Calif.

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Australian Gemstones

R. O. CHAMBERS*

THE SUBJECT of Australian gemstones is full of interest but only about one half per cent of the world's total production comes from that country. Ninety-five per cent of the world's total value is represented by uncut diamonds, the vast majority of which comes from Africa.

While all important gemstones with the exception of the ruby occur in Australia, they are not all of equal importance. Indeed, viewed from the world scene, Australia is only regarded as a producer of opal, sapphire, and zircon with the possible inclusion of emerald. In addition to these, I will deal in some detail with beryl, topaz, tourmaline, and diamond. No more than passing mention here can be made of others such as quartz, turquois, and garnet.

Sapphire: Practically the whole Australian output comes from Anakie, 192 miles west of Rockhampton, Queensland. Here, although entirely recovered from alluvial deposits, it seems certain that the sapphire originated as a rock-forming mineral in a basalt which filled small valleys at the time of its eruption. Hot solutions from the basalt silicified the alluvium which had formed along the stream beds. No trace of these valleys remains today but isolated patches of alluvium, consisting of basalt debris and

*Prepared for, and furnished by Australian News and Information Bureau.

• **This miner is hauling a bucket to the surface while his partner works below ground level. An empty bucket is seen in the background.**

silicified alluvium debris, remain and the sapphires are extracted from these deposits by washing the dirt through a sieve and picking out the sapphires by hand when most of the dirt has been washed through.

Blues and greens are the two principal gem quality colors although many stones are part-colored. Yellow stones, as well as light green and greenish yellow varieties, often have a distinct golden tinge which makes them objects of great beauty peculiar to Australia.

True sapphires and green and multi-colored stones occur in alluvium derived from basalt areas in the New England district, particularly at a locality known as Sapphire which lies between Glen Innes and Inverell.

In general, many good quality stones possessing the much desired light cornflower blue color have come from Australian fields. There is a general erroneous idea prevalent that all Australian sapphires are very dark inky blue.

Beryl: Three gem varieties, ordinary beryl, emerald, and aquamarine, have been found in pegmatites in New South Wales, particularly in the New England District. Heffernan's mines at Torrington have produced some fine gem quality beryls, while true emeralds have come from Ammaville, a nearby locality. Beryls are usually associated in these localities with quartz, topaz, and cassiterite (the chief ore of tin). In Western Goldfield, there is a limited occurrence of emeralds. A considerable quantity of beryl, some of gem quality, has been found in the pegmatite dikes of the Hart's Range, Central Australia.

Topaz, Zircon, and Tourmaline: These three gemstones have this much in common, they are three reasonably common minerals although gem varieties are not found so often. Then are all constituents of granitic rocks or of pegmatite dikes.

The prevailing color of Australian topaz is a pale water-blue or green which makes it often difficult to distinguish from aquamarine. It is usually manufactured by subjecting the yellow variety from Brazil to heat treatment.

The gravels of many rivers in the New England District of New South Wales notably at Oban, yield pale blue waterworn stones of the highest quality topaz. They have also been found in other rivers of N.S.W. such as the Macquarie and Shoalhaven. Excellent topaz also occur in Tasmania, and on Flinders Island, Bass Strait.

Zircon has a very similar occurrence to topaz and, indeed, usually occurs associated with it in alluvial deposits. This is certainly the case in New South Wales. Yellowish, colorless, and red stones are the commonest varieties. The well-known pale blue variety of zircon known as Starlite is not found in nature. It is derived from common, reddish brown, transparent material by a secret process of heat treatment. The Anakie field, Queensland, is the chief producer.

Tourmaline of gem quality is only found at one Australian locality, Kangaroo Island, off the South Australian coast. Red, blue, and green varieties have been found. Sometimes color zoning is shown. This together with color banding is a frequent feature of tourmaline.

Opal: As with most other gem minerals there are two varieties of opal, precious and common. The common variety is of world-wide abundance, but the precious variety is a much prized rarity. Precious opal is Australia's most important gemstone.

The great beauty of precious opal is due to its play of colors which is not caused by any pigmenting agent but wholly by the behavior of white light when it enters the stone. In *White Opal* the colors appear in a white background, in *Black Opal* the play of colors appears in a black background. Other almost self-explanatory terms are used to describe other precious varieties such as *Harlequin Opal, Pinfire Opal,* and *Flash Opal,* Before the discovery of the famous Australian fields in New South Wales, Queensland, and South Australia, opal was found only in isolated parts of Hungary, Mexico, and U.S.A. and then in nothing approaching the quality, abundance, and variety of Australian occurrences. In these foreign localities the gem occurs filling cavities in volcanic rocks. Although this type of occurrence is found to a very limited extent in Australia at Tintenbar on the north coast of New South Wales and at the Abercrombie River, also in New South Wales, the principal occurrences are quite unique. It is no accident that the principal opal fields are situated in arid regions. During the Tertiary period some 30,000,000 years ago, on the surface of inland Australia, were found sedimentary rocks that had been deposited under marine conditions many millions of years before. Under the prevailing conditions of alternating wet and dry sea-

• A prospector starts a hole in a new area in an attempt to discover new deposits of opal near Andamooka. This hole was sunk 43 feet into the ground.

• Life is hard in the opal mining fields of Australia. Shown above are Andy Absolam and his wife, two of the oldest residents in the district. Mrs. Absolam, probably the only licensed woman opal miner in the world, has sunk about 50 holes through solid rock during her 15 years in Andamooka.

sons, ground water was drawn to the surface and in solution it carried much silica that had been dissolved from the underlying rocks. It also carried smaller amounts of such constituents as iron oxide. On the surface, due to evaporation, these constituents were deposited in the form of a hard siliceous crust, known to geologists as the "duricrust" but also in the underlying sediments. The chief opal producing localities are Opalton, Jundah, Quilpie, and Cunnamulla which are scattered over quite a wide area in Central and Western Queensland; in New South Wales, Lightning Ridge the home of the black opal, Grawin, and White Cliffs; in South Australia, Coober Pedy and Andamooka.

Opal, despite its great beauty, has the disadvantage of being not very durable. It is inferior in hardness, and care must be taken to prevent scratching. Sudden changes in temperature tend to upset the rather delicate state of equilibrium in which the opal finds itself, and the stone may crack. This is known as crazing.

The published figures for production which must be considered as a very conservative estimate, are as follows — New South Wales up to 1938, £1,627,021 ($3,644,527); Queensland, up to 1939, £187,825 ($420,-728); South Australia, up to 1939, £170,748 ($382, 475).

Diamond: Diamond was first discovered in New South Wales in 1851 by E. G. Hargreaves who also discovered the first payable amounts of gold in the state. It was associated with gold and came from the Bathurst district.

In 1867 diamond, associated with other gemstones, gold, osmiridium, and cassiterite was found in the alluvium of the Cudgegong River some tweny miles northwest of Mudgee. The largest stone recorded was only one and one half carats.

Some years later the Bingara diamond field came to light, the stones again occurring in alluvium. The largest from this field weighed nearly three carats.

The most important Australian field is at Copeton, some sixteen miles to the south of Inverell in the New England district. The diamond occurs in an old river drift. The country rock of the district consists of claystones and tuffs intruded in places by granite. In many places the drifts are capped with basalt of Tertiary Age. These drifts represent the course of an old river parallel to the present Gwydir River. In Tertiary times this old valley was filled with molten lava which eventually consolidated to form basalt. Cassiterite is associated with diamond in these drifts, or deep leads as they are sometimes called. Indeed diamond was first found here by prospectors who were mining for tin.

The stones are of distinctly larger size than those from the Cudgegong or Bingara.

They average about one third of a carat. The largest stone yet found, which without doubt came from this field, weighed six carats. Like so many other Australian diamonds, it was yellowish or "off-color" to use the usual expression.

The average thickness of the diamond-bearing wash, or drift, is from three to four feet. Its maximum thickness is fourteen feet. In places the wash is quite consolidated and very often the diamond is firmly embedded in it.

In none of the Australian diamond fields has diamond been found in the parent rock despite statements to the contrary. It is always found in alluvial deposits formed originally by the weathering of the parent rock and subsequently transported into stream channels.

Diamond has been found in other New England localities and also from some southern districts such as occurs in Queensland and Tasmania.

The official record of the Mines Department shows that up to the end of 1937 the total quantity of diamond from all fields was 205,243 carats valued at £147, 649 ($330,-734). It is by no means certain that these figures are complete. They are probably much of an understatement.

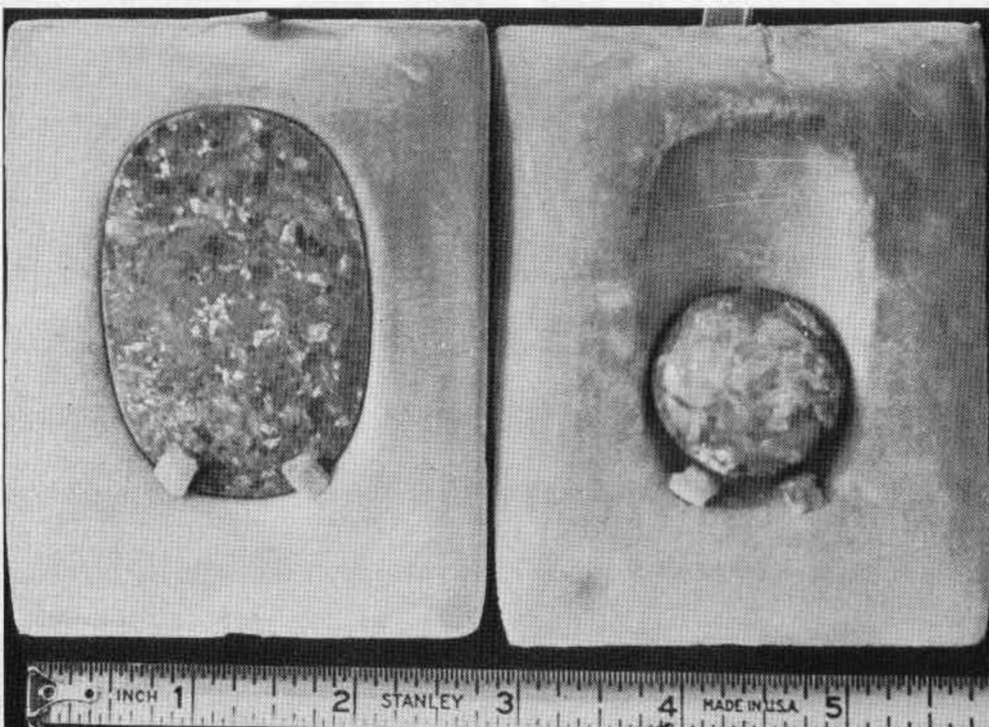
Since Australian diamonds are always very small and mostly "off-color," they are not generally suitable for ornamental purposes although there have been some cut into quite attractive gemstones. Australian diamonds are, therefore, generally more used for industrial purposes which leads us to the question of their hardness. In 1886 it was first reported that the Australian diamonds were harder than those from South Africa, judging from the time taken to grind facets. This was stated in a general way by the

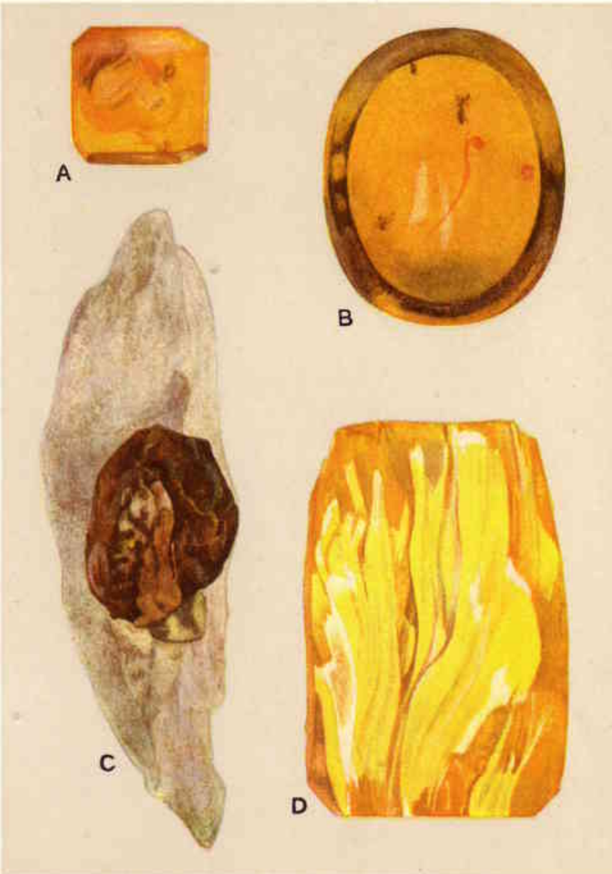
• This is one of the relatively few homes at Andamooka built above ground. It is made of stone picked up around the opal field. Hessian covers the roof and because of the absence of rain, it is not necessary to make it waterproof. Because of the scarcity of building materials, most miners make their homes below ground and in hillsides.

London firm of diamond cutters to whom Australian stones had been sent for the first time to be cut as gems. Since that time all additional experience gained in cutting Australian stones has pointed to this and I believe it to be correct, in a general way.

Important evidence was gained from the experience of Australian industry during the war when large quantities of Australian diamond were used because of shortages of the imported stones. All the experience of industry is in support of the view that the Australian diamond is much harder than diamond from elsewhere, that is mainly from South Africa. In one operation a tool was used to cut a playing bowl in the prescribed slightly asymmetrical fashion. A tungsten carbide tool needed resetting after cutting only one bowl. A tool tipped with African diamond would cut 400 bowls before it needed resetting while an Australian diamond tip would cut 900. In dressing grinding wheels a diamond point is drawn slowly across the face of the wheel. As the size of the wheel increases a larger diamond is used so that it will not be necessary to reset the stone before finishing the operation. With a wheel of given size, if an Australian diamond is used it need only be half the size of the African diamond required to do the job, thus indicating a much less rapid rate of wear.

• Two rare specimens of Australian black opal. At the left is a cut and polished opal and at the left is a smaller blue opal.

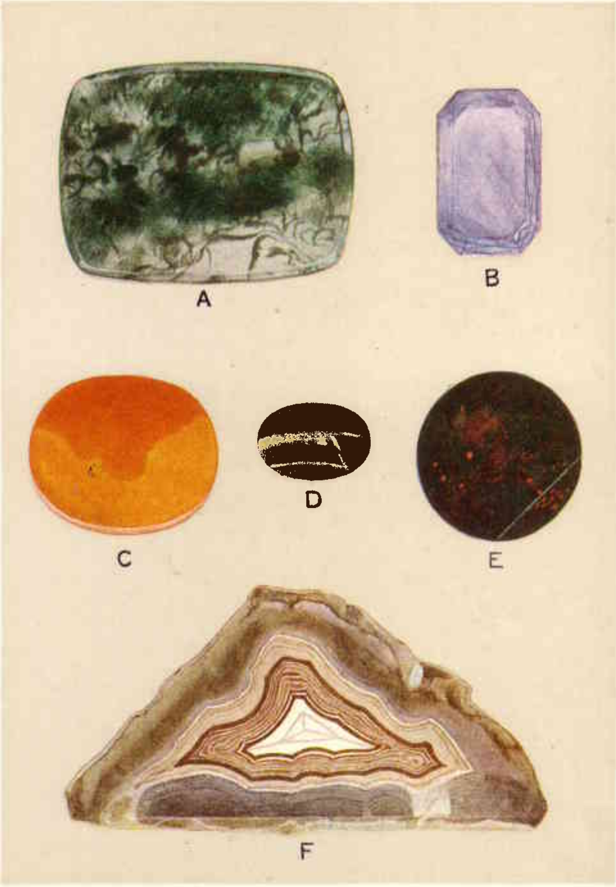




AMBER

Enclosed insects are seen in the amber (A) from the Prussian Coast and (B) from a deposit in Sicily. Dark brown amber in oolite from Westphalia is seen in Figure (C) and a piece of the familiar Prussian bone Amber is pictured at (D). Specimens from the collection of British Museum (Natural History), London.

Printed in England.



QUARTZ
(Chalcedony)

A large polished moss agate is shown at (A). Figure (B) is a less common, almost transparent blue chalcedony. This stone is from Transylvania. Due to its crypto-crystalline structure, chalcedony is rarely found in a transparent state. The reddish stone (C) is carnelian and the cabochon (D) is tiger-eye, the fibrous structure being the result of quartz replacing asbestos. A bloodstone showing the scattered spots of red jasper, for which it is named, is shown at (E), and (F) shows a natural banded agate from Uruguay. Specimens from the collection of British Museum (Natural History), London.

Printed in England.

• Cathedral at Diamantina, rebuilt since 1928.

The Diamond Mines of Diamantina—past and present

by

THOMAS DRAPER

Part II

Very little information is available regarding the Discovery Period but it is a historical fact that as early as 1732 diamonds from Brazil began to appear in the European markets in larger quantities than could be absorbed. To counteract this flood, the rumour was spread that they were inferior to the Indian stones. To this the Brazilian miners retaliated by shipping their product via India. Mawe estimates that the first twenty years yielded 20,000 carats per annum but does not give his authority for the statement. If any records were available to him for reference they have since disappeared.

The Contract Period seems to have been the most productive. By violating the terms of their contracts regarding the number of slaves (600) that could be employed, and by selecting the most likely and easiest pools to work, the Contractors reaped rewards that were denied their successors. Joao Fernandes Jr., as mentioned in a previous article, is said to have recovered *dez mil* *oitavas* (175,000 carats) during the course of one year on the banks of the Jequitinhonha river immediately above a pool (Pocao de Moreira) on which he was engaged in diverting the river. According to Felicio dos Santos, the records of the Contract Period consisting of five big, leather bound tomes, were sent to Ouro Preto for safekeeping but they have since disappeared. Failure to trace these priceless records in Ouro Preto and elsewhere is responsible for the uncertainty regarding the production during the Contract Period.

The Extraccao began operations with 5000 slaves, divided into gangs of from 200 to 400, and during its existence covered practically the entire area including the intermediate sections in the river beds left by the Contractors. Its records have also been lost due to the carelessness and vandalism of the Brazilians themselves. The writer himself has seen two volumes from which many leaves were torn to make sky rockets. They consisted of two ponderous tomes bound in leather and ruled off in columns showing the number of slaves employed in each "service," the man days worked, production of diamonds and of gold, and finally a column containing observations regarding events of the day, prices of commodities, purchase price of a slave and the cost of his burial, and more especially the sizes of the largest diamonds found including the weight of those exceeding *one oitava* (17½ carats) which, when found by slaves, entitled them to freedom from slavery. Both these mutilated and priceless volumes are now in the hands of private collectors instead of being in the Historical Museum of Diamantina where they belong. One of these was saved from further destruction by Nelson Humphrey, a diamond buyer from Boston, who lived for many years in Diamantina and who, after retiring to his native city, returned to Brazil because, he said, "they don't know how to cook beans in Boston."

From one of these books the writer took the following extracts of production by the Royal Extraccao from the areas indicated.

Angu Duro & Barra de "O"	22.9	kgs gold	40,346 carats
Barra de "O"	13.24	" "	8,678 "
Corrego de Macacos	1.29	" "	4,892 "
Massangano & Acaba Sacco	10.40	" "	10,687 "
Capivari	5.22	" "	23,141 "
Ponte de Sao Goncalo	14.97	" "	18,472 "
Mosquito	9.68	" "	5,545 "
Carrapato	77.75	" "	19,645 "
Lavra do Matto	24.13	" "	26,639 "

There, areas are all situated in the Jequitinhonha river between its source near Serro and Mendanha. Mawe visited Carrapato and describes it as a gold mine.

To those of us who are engaged in diamond mining in this field it is not the loss of the records of production that we deplore so much as the fact that we are not able to identify the areas that have already been exploited. This results in losses that might otherwise be avoided by reworking areas from which the diamonds have already been recovered by our predecessors. Less than a week ago the writer met another victim who had spent Cr. 70,000.00 he could ill afford.

These *restingas* are invariably rich and worth the risk, but very few are successful. Legends assert that part of Pocao de Moreira previously mentioned, is still 'virgin.' Cambraia, one of the largest and deepest pools in the Jequintinhonha and part of Pedro Dias, immediately above Cambraia, are also said to be intact. The production of diamonds from the Diamantina field during the periods under review is not definitely known. In *As Pedras Preciosas,* published in 1949, Alpheu Diniz Gonsalves gives the annual production of Brazil from all sources up to the date of publication from which its quota is now assigned to the respective periods.

Discovery	307,000	
Contract	1,639,725	
Extracaco	1,210,770	1772 to 1818 only
	3,157,495	

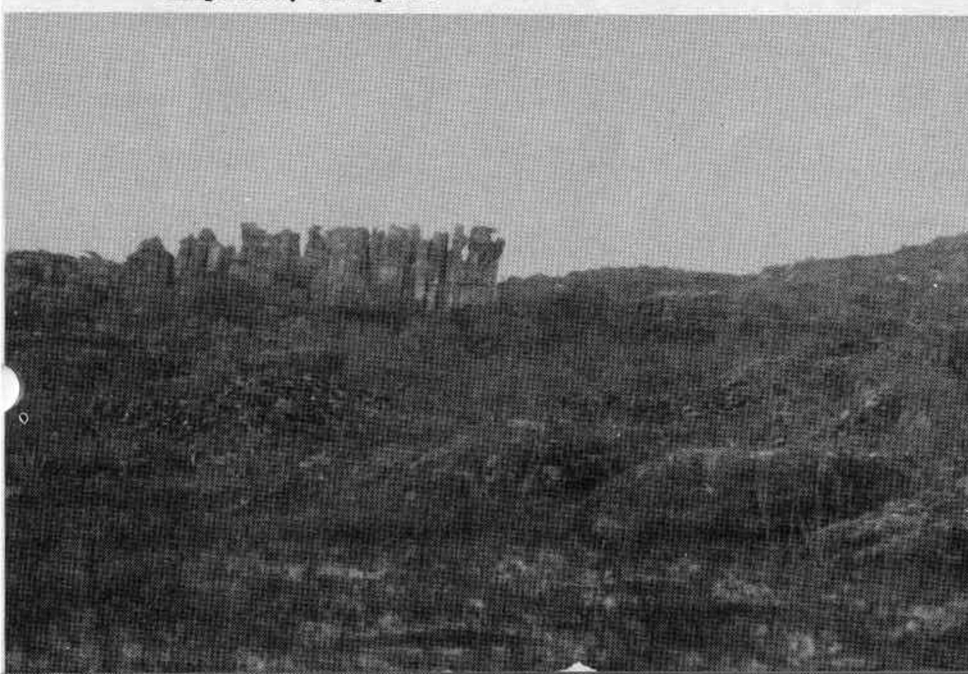
• **Barro mine near Sao Joao da Chapada where massa was first discovered.**

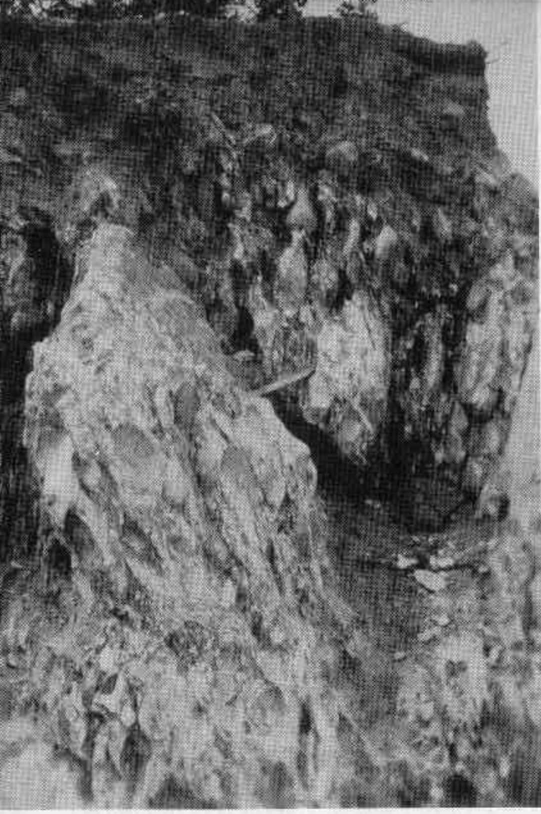
Spix and Martius, who visited Diamantina shortly after Mawe and who probably took their figures from the actual records, assign 1,300,000 carats to the Extraccao showing a difference of nearly 90,000 carats additional. This is merely one example of how historians differ.

The greater part of this production was undoubtedly derived from the Jequitinhonha river from Mendanha to its source. Below Mendanha it is practically intact and, constitutes as will be shown at a later stage, one of the most important elements in the future of the mining industry of this region.

The close of the Contract Period coincides with the discovery of a more permanent source of supply, the High Level or *Massa* mines from which the region derives its alluvial diamonds. Previous to this event the source of alluvial diamonds had been a

• **This view near Sopa shows type of rock weathering and old dumps left by Garimpeiros.**





• **Close-up of massa at Serrinha mine.**

mystery and a matter of speculation but now, finally, they were traced to their origin if not to their matrix.

Professor Orville A. Derby, for many years Director of the Geological Department, first of Sao Paulo and then of Rio, describes this important event in the following words:

"The first example of the material later known as *sopa* appears to have been (either) near the little village now known by that name (or) in the Barro mine near the village of Sao Joao da Chapada where, in 1830, the mining of this material was started. At that time, near the village of Sao Joao, the surface wash was being mined by one Antonio Correia. He was getting good results. He noticed that his slaves were in possession of many diamonds and, on making inquiries as to where they came from, found that they were being recovered by the slaves from what he considered to be bedrock but which was really a clay very rich in diamonds. He therefore immediately started mining this material himself."

It is not known whether the village of Sopa takes its name from the material or vice versa. Probably it had not been tested for diamonds but the section between Sopa and Guinda was, and still is, one of the most consistent and prolific in the region. It was near Sopa that Camara had his *Chacara* or country residence from the back yard of which he is reported to have taken many diamonds.

The word *massa* has now substituted the original term *sopa* conferred upon it by the *garimpeiros* and subsequently adopted by Derby, Gonzaga de Campos, Gorceix, and other geologists who visited the area during the last half of the 19th century. Both words imply practically the same thing—a soup or water-sodden condition.

It also occurs in a more indurated state where natural drainage has deprived it of its moisture, but is seldom too hard to yield to water under moderate pressure or even to ground sluicing. *Massa,* although believed to be the matrix of the diamond in this region, has not hitherto been found elsewhere in Brazil and leaves the origin of diamonds in other regions unexplained. It differs from kimberlite both in appearance and chemical composition and may, at first sight, be mistaken for an ordinary conglomerate. On closer examination, however, it presents disconcerting differences which are responsible for the variations of opinion regarding its origin.

Professor Archibald Geikie, who had probably never seen or heard of *massa,* describes a similar occurrence in his *Text Book of Geology* (page 181, 1st Ed.): "In some regions of schists not only bands of quartzite occur, representing former sandstones, but also pebbly or conglomerate bands in which pebbles of quartz and other materials from less than one inch to more than a foot in diameter, are imbedded in a foliated matrix which may be phyllite, mica schist, gneiss, quartzite, etc. The pebbles are not to be distinguished from waterworn blocks of ordinary conglomerates but the original matrix which encloses them has been *so altered as to acquire a micaceous foliated structure and to wrap the pebbles round as with a kind of glaze.*" This description of occurrences in France, Saxony, Norway, the Highlands of Scotland, and Northwest Ireland corresponds in almost every detail to the material comprising the majority of the *massa* mines of the Diamantina region.

In some mines, however, the micaceous element is replaced by angular grain of quartz. A common feature of all the mines is the highly decomposed condition of the quartzite boulders and even of the pebbles of quartz which constitute an appreciable percentage of the entire mass. The large boulders can frequently be crushed by a gentle pressure of the hand. It is generally assumed that the cementing sericitic[1] material is the source of the diamonds since an increase in the mica usually heralds an increase in production.

Massa is composed entirely of the schists, shales, and quartzites of the Minas series and quartzites of the Lavras series, and does not contain any of the South African satellites except occasionally a few booklets of mica. It has been noted that an increase in these booklets is usually followed by an increase in diamonds. A feature of special interest is the total absence of gold in *massa* which, considering that this is a gold bearing region, is hard to explain.

Massa occurs in isolated outcrops extending for a distance of nearly 100 miles in a southerly direction from Corrego Novo as shown on the accompanying map. It includes Corrego Novo itself, Campo Sampaio, Pagao, the Sao Joao da Chapada group comprising the Barro duro and Barro mole mines (hard and soft respectively), Morrinhos, Alto de Morrinhos, Damasio, and the Sopa and Guinda groups Canudinhos, Dumba, the Dattas mines, and finally the Tejucal outcrops not shown on the map.

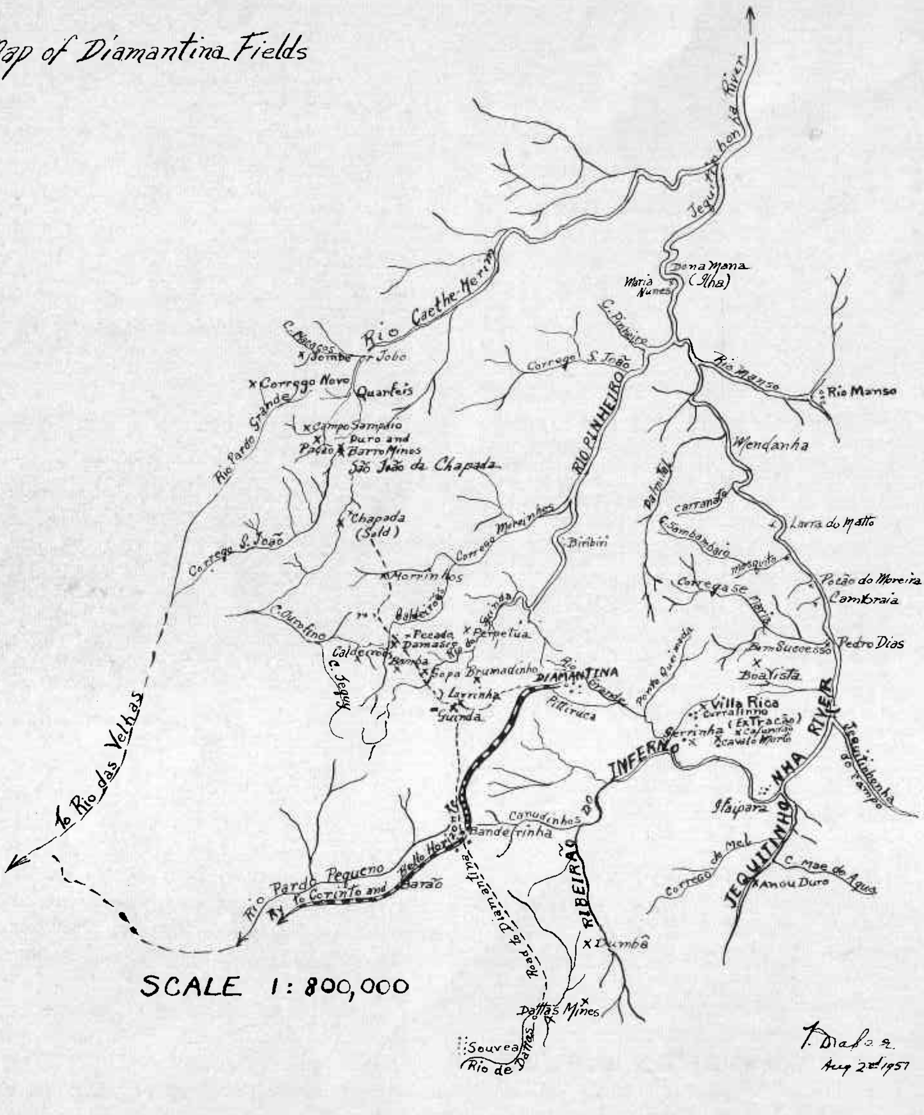
These occurrences adhere roughly to a anticlinal fold constituting the watershed separating the Jequitinhonha and Sao Francisco rivers. In addition to the above, there are also outlying mines including Jombo northeast of Campo Sampaio, and the Serrinha, Villa Rica, Cavallo Morto, Cafundao, and Boa Vista.

As all of these outcrops, and other smaller ones not specified, have proved to be diamondiferous it must be conceded that they are the secondary, if not the primary, source of diamonds found throughout the Diamantina region. Unless and until this is disproved, and if these are true metamorphosed conglomerates, the question arises as to when, how, and where they picked up their

• Serrinha mine, showing orientation and separation of pebbles.

1. Fine grain fibrous form mica, usually resulting from alteration of feldspar, etc.

Map of Diamantina Fields



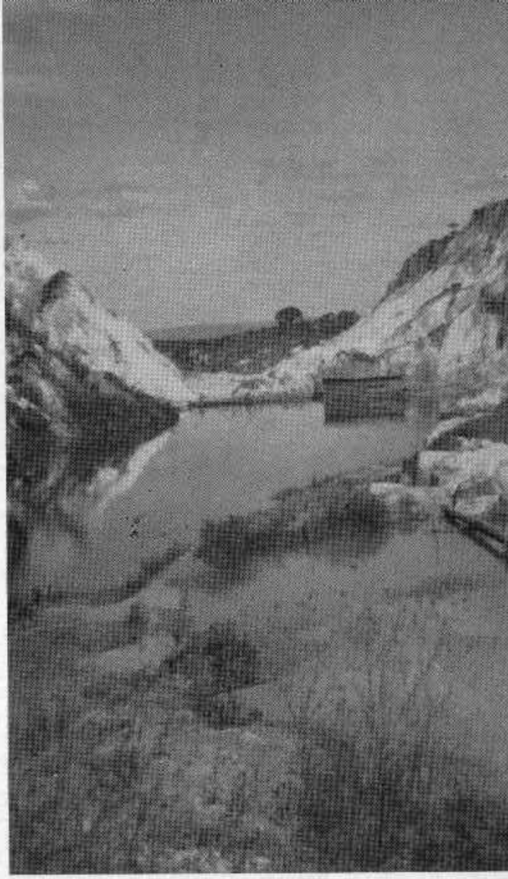
diamond content. If of local origin, the question becomes even more complicated.

The fact that each mine produces diamonds of a distinctive character cannot be explained by any traditional theory, whether glacial or aqueous, since neither of these could possibly have exercised a selective action in distributing diamonds. It is generally conceded that the Barro duro and Barro mole mines at Sao Joao are of an intrusive nature but evidence in the others, with one or two exceptions, is less conclusive. The problem can only be solved by a detailed study of the entire field and not by the cursory visits of geologists whose conclusions are incompatible and irreconcilable. This is especially true of the younger Brazilian geologists whose sections are nice to look at but do not represent actual conditions. The writer's own father, Dr. David Draper, must also be included among those who, subsequent to his published opinion, regretted that he had not given greater consideration to the subject. This, however, was hardly entirely his fault since he relied upon analysis subsequently withdrawn by the analyst as being erroneous.

Massa mines are not rich. In fact they are exceedingly low grade compared to the South African kimberlites. There is hardly any mine in the district which has consistently averaged four carats per hundred cubic meters. During the four years the writer was associated with the Boa Vista Company its mine averaged less than one carat per hundred cubic meters, or one carat to 220 Kimberley loads. Even with this low average it yielded a profit, and is still doing so occasionally.

The Serrinha mine, properly equipped with an adequate plant and sufficient water, has not only repaid all its original expenditure but also added a very appreciable profit. Given a sufficient quantity of water, access to electric power, and appropriate machinery, any *massa* mine can be made to pay by hydraulicking, but there are few that meet these conditions.

It is the belief of the author that the Boa Vista Company could be made to rank



• General view of Duro which is a continuation of the Barro mine.

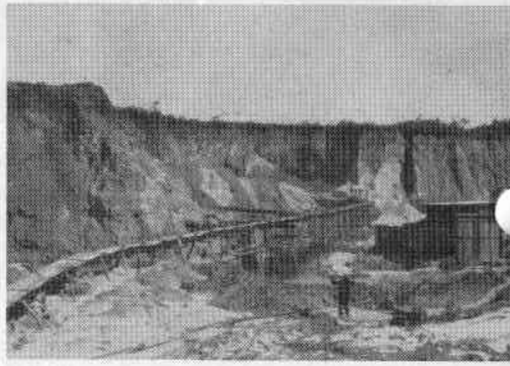
among the best if operations were planned to take advantage of its possibilities. Unfortunately, however, that has not been done. The Sopa and Guinda mines do not lend themselves to large scale operations since they have not only been extensively worked but also lack sufficient reserves to justify operation. The Campo Sampaio and Sao Joao mines lack both power and water but would justify sufficient expenditure to provide both.

One of the most promising mines in the Cavallo Morte region, which has so far not received the attention it deserves, is now being provided with sufficient capital to install an adequate plant and promises to be one of the most productive in the region if its past records as a *faisqueira* are maintained.

The Dattas mine became too indurated to hydraulick and is not rich enough to justify any other method. It was also divided into parts by a highly decomposed dike of a basic igneous character 30 meters wide, too highly decomposed for identification. Similar dikes also occur in the Boa Vista mine and in the Serrinha, where it has been noted that diamonds on one side differ from those on the other.

All these mines were originally exploited as alluvials by the *Bandeirantes* and their successors and then took on a renewed life when *massa* was discovered below the *gorgulho* or surface gravel. *Garimpeiros* have been responsible for the greater part, in some cases all, of these operations. Campo Sampaio, one of the most extensive excavations in the region, has never been worked by any mechanical aids worthy of the name. The Barro duro and Barro mole mines, which now represent a continuous open cut nearly a mile long, 20 meters deep and about 80 meters wide, are also a tribute to the *garimpeiro.*

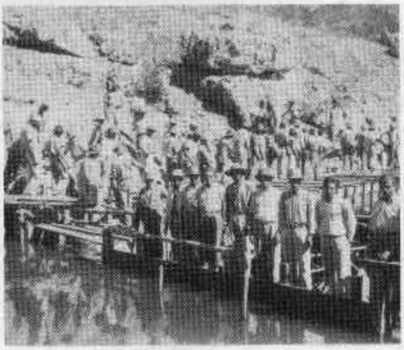
It is a strange fact that there are only three companies operating in Brazil, Serrinha, Boa Vista and Agua Suja in the Triangulo Mineiro, and that they are only producing an insignificant proportion of the total diamond output of Brazil. The writer has in his possession a list of 38 companies that have been formed to operate in this district including those mentioned above, Serrinha and Boa Vista.



• Flume for carrying water at the Boa Vista mine.

The first company to operate in this field was organized in France to exploit the Boa Vista mine but its program proved to be too ambitious and its transportation prob-

• View of the Duro mine showing massa discarded by the Garimpeiros in the background. All had been carried out on the carrombe (wooden platter).



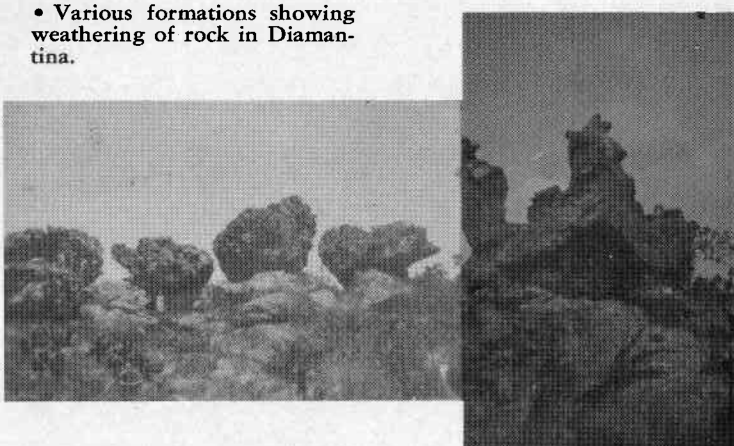
• Workmen engaged in constructing flume which carries away the diverted stream of the river bed.

lem too expensive. It tried to divert the Jequitinhonha through a loop of the letter S at Logea Secca, but did not succeed in making the canal deep enough. At Boa Vista it installed a pump weighing many tons from which the writer subsequently sold nearly Cr. 20,000.00 worth of scrap, including bronze fittings, at a price when scrap was hardly worth anything. It attempted to exploit the Pacao Moreira which is one of the most difficult of its kind in the Jequitinhonha. Its operations on the Parauna river were also a failure.

About the same time an American, Meyer by name, formed a number of companies in the United States—in Pittsburgh, Cleveland, Chicago, and New York as well as several in England. These, however, have been mere stock selling propositions since they never achieved anything but failure. Some of them, in fact, never even got started. One was formed to dredge the Jequitinhonha but the dredge was bought by tender from the scrap heaps of California and proved almost impossible to assemble when it finally arrived at its destination. One of its operators, Christie M. Spangler, mining on his own account, subsequently took out a fortune from Tiririca, one of the very areas in which the dredge was supposed to operate. Another was originally one of Buffalo Bill's rough riders and stunt artists who, in later life, gained part of his living by riding around the country with a trained fortunetelling canary.

Two of the most dismal failures were formed in England, the Sopa and Cascalho Syndicates. The Sopa Company, whose promoters were eventually compelled to return some of its subscribed capital, should never have been started for reasons already stated above. The Cascalho Syndicate owned and intended to exploit the Dona Maria and Ilha properties on the Jequitinhonha, below Mendanha, from which sensational results are now being obtained. The first World War prevented acquisitions of the neces-

• Various formations showing weathering of rock in Diamantina.



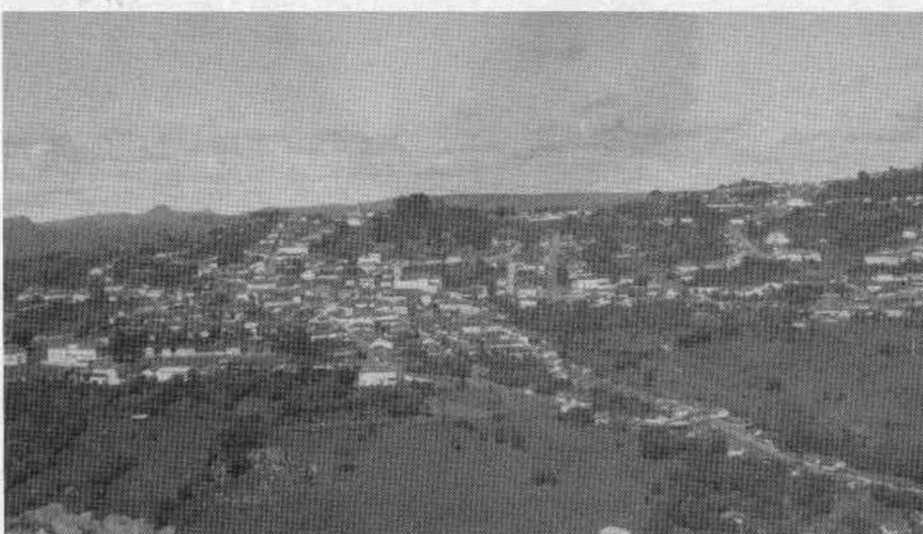
sary plant without which it failed to yield a profit.

These are only a few of the highlights of the past history of this field which, from 1728 to the discovery of the South African mines, was the principal source of supply of the world's diamonds and still produces an appreciable percentage of the Brazilian output.

As previously stated, mining is done principally by the *garimpeiro* but, confronted by the present high cost of living and attracted by higher wages elsewhere, the old timers are leaving the district in ever increasing numbers. The younger generation has only one ambition, to become chauffeurs and truck drivers. It is evident from these facts that these Diamantina fields are doomed to failure as far as mining by the *garimpeiro* is concerned. But, as long as the Jequitinhonha river continues to wind its way to the sea, there is always a hope that dredges will replace the *garimpeiro.*

Although the Jequitinhonha has practically been gutted from its source down to Mendanha below this point, it is intact except for a few minor operations at different points. Along its entire course it is being fed by rivers which have their sources in or near diamond bearing areas. By these successive stages it has been enriched from point to point, even down as far as its entry to the sea where the Salobro field testifies an unbroken sequence of enrichment in both gold and diamonds. Excluding a few quartzite barriers, drilling tests have proved that it is eminently suitable for dredging and the fact that it contains both gold and diamonds should insure that either one or the other will cover operating expenses. This is a feature which has not been duplicated elsewhere in the history of dredging and constitutes one of the most potent reasons for confidence in the future of Diamantina.

• Bird's-eye view of the city of Diamantina.



Edward F. Herschede Dies

Served 19 Years on GIA Board of Governors

The death of G.I.A. Governor, Edward F. Herschede of Cincinnati on September 27, 1951, will come as a shock to many readers of *Gems & Gemology* who have known and respected this industry leader through their years of association with him.

While vacationing in Canada with Mrs. Herschede, he slipped off a curb and fractured a hip. After three weeks of hospitalization in Toronto, death followed this accident. He was 70 years old.

Edward Herschede was outstanding among the many volunteers whose interest in the welfare of their industry stimulated them to devote an important part of their lives to the gemological movement.

He had served continuously on G.I.A.'s Board of Governors since the Board's establishment in 1933. At that time he was twice a member of the Retail Jewelers Research Group, without the support of which Robert M. Shipley might never have extended the Institute nationwide.

He was the third chairman of the G.I.A. Board, serving from 1941 to 1944 and proved outstandingly successful during the important period which the Institute was incorporated and the G.I.A. Endowment Fund raised by the American Gem Society. It was then that Mr. Herschede's legalistic ability proved especially valuable in the formulation of G.I.A.'s constitution and by-laws. He represented G.I.A. as an instructor at Conclaves of the American Gem Society, being one of several graduates who were always present. For many years he served as G.I.A.'s representative on the Jewelers Vigilance Committee.

He was fearless in debate when he believed the Institute's welfare was endangered. Always generous in thought and courteous in action, he was greatly beloved by those who worked with him.

Nationally known in the retail jewelry business, he was past president of the Retail Jewelers Research Group and has served on the governing body of the American Gem Society, as well as that of the Gemological Institute. An early graduate of the Gemological Institute, he was the twenty-second person to be awarded the title of Certified Gemologist, which he received in November, 1936.

From 1922 until two years ago he served as president of the Frank Herschede Company of Cincinnati which was established 74 years ago by his father, the late Frank Herschede. In 1948 he relinquished the presidency to his brother Lawrence and became the Chairman of the firm's Board.

Besides his widow, Amelia Kroeger Herschede, he is survived by one son, seven daughters, nineteen grandchildren, and two great grandchildren.

Gemological Institute of America Awards 45 Diplomas

Forty-five students of the Gemological Institute of America have been awarded diplomas since the last announcement was made in *Gems & Gemology.* Eleven of this number were awarded diplomas in the Theory and Practice of Gemology for having successfully completed both correspondence and resident courses. The eleven are:

Edward C. Borland, Kenosha, Wis.

George W. Cobb, Anniston. Alabama.

William L. Cowan, Merced Falls, Cal.

Alfred Dana, Brighton, Massachusetts.

Glenn E. Dobson, Pullman, Wash.

Wendell C. Johnson, Clear Lake, Iowa.

Joseph F. Person, St. Petersburg, Fla.

Jean W. Pressler, Albany, Oregon.

Robert Levasseur, Taunton, Mass.

Theodore H. Shaw, South Beloit, Ill.

John Y. Thomson, Alexandria Bay, New York.

Diplomas in the Theory of Gemology from the Gemological Institute of America, awarded upon completion of correspondence courses, were received by the following thirty-four persons:

Raoul N. Alie, Dover, New Hampshire.

Ralph W. Barrett, Yukon, Florida.

Ross O. Beube, Shelbyville, Illinois.

A. Bonebakker, Naarden, Holland.

Clifford Briggs, London, Ontario, Canada.

Harry A. Bucey, Jr., Steubenville, Ohio.

Robert N. Cheetham, Newport, Rhode Island.

Stephen S. J. Ching, Honolulu, T. H.

John Durovchic, Erie, Pennsylvania.

Robert H. Evans, Honolulu, T. H.

Alton Baker Fowler, Boston, Massachusetts.

Martin D. Freeman, Rutland, Vermont.

Frank Goldstein, Sacramento, Calif.

Norville Edgar Hawk, Alexandria, Virginia.

K. Norman Heyne, Twinsburg, Ohio.

Warren J. Keister, Nampa, Idaho.

George N. G. Kendall, Memphis, Tennessee.

George H. M. LeRoy, Taunton, Massachusetts.

John H. Matlock, Lewiston, Idaho.

Hugh E. Metzler, Arkansas City, Ark.

Robert Ochfield, Baltimore, Maryland.

Alphonse Panisello, Flushing, L. I., New York.

Florenz M. Pinjuv, Las Vegas, Nevada.

Paul Richter, Portland, Maine.

Alfred M. Ross, Philadelphia, Pennsylvania.

Herman Singer, Washington, D. C.

John Sinkankas, Arlington, Virginia.

Stanley S. Smith, Minneapolis, Minnesota.

Roy L. Stiles, York, Nebraska.

Renato Tieger, Milan, Italy.

William E. Verrant, Hannibal, Missouri.

Dolores M. Wolf, Red Lion, Pennsylvania.

Kenneth E. Zarder, Milwaukee, Wisconsin.

Monroe L. Zarne, Milwaukee, Wisconsin.

Gemological Digests

HEAD OF LINCOLN CARVED IN SAPPHIRE

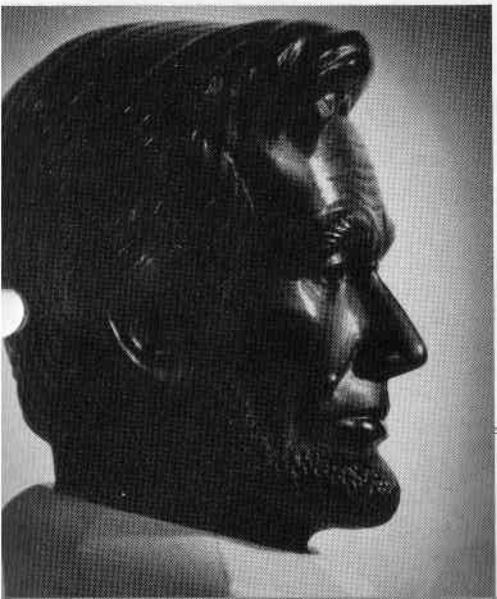
Many media — bronze, copper, wood, marble, clay, granite — have been used to portray the strong features of the world's Great Emancipator. But never before has the face of Abraham Lincoln been carved in material of the comparable hardness of corundum.

This 1318 carat, deep blue sapphire head is owned by Kazanjian Brothers, Los Angeles precious stone dealers, and is introduced as the first in a series of four "Great Americans in Sapphire." Others in the series will be Andrew Jackson, George Washington, and Henry Ford.

The Kazanjians, Harry and James, have a profound respect for America as a land where a man, through individual effort, may reach the top from obscurity.

Explaining their choice of subjects, James Kazanjian said, "Lincoln and Jackson were always great heroes of ours and it was natural to select Lincoln for the first stone. Next we think will be Jackson because he stands for the real spirit of American opportunity. Then will come Washington, as the first president, and Henry Ford as the symbol of initiative in our day."

• **Lincoln in Sapphire—actual size.**



The Kazanjians, who in 1948 acquired what are believed to be the five largest sapphires in existence, cut the larger of the five into the 733 carat "Black Star of Queensland," which has been on tour for the past two years. The remaining three will be used in creating the balance of the "Great Americans in Sapphire" series.

The Lincoln head was cut from a rough crystal weighing 2302 carats. The finished head, which is 2-9/16 inches in height, 1¾ inches in width, and 2 inches in depth, weighs 1318 carats.

When the decision to cut the sapphire was reached, Norman Maness was selected by the Kazanjians for the delicate task of carving. Maness, a Missouri carpenter who took up steel engraving and die making in Los Angeles as a result of a war injury, started the painstaking and exacting work on November 7, 1949.

There had been no precedent for carving a stone of this size and hardness and he was faced with both technical and aesthetic problems. Not only must the task be accomplished without chipping or fracturing the crystal, but the finished product must bear all the character and dignity of the great American. How successful he was in achieving this result can be seen from the photograph.

First Maness tried cutting the sapphire with carborundum. This proved unsatisfactory, however, and he was forced to use diamond grit entirely. Finally, the general shape of the head began to emerge.

Dr. Merrell Gage, celebrated sculptor and Lincoln authority, was asked to advise and counsel with Maness on refinements of expression. Much of Dr. Gage's training had been received from Gutzon Borglum who created the Lincoln head on Mt. Rushmore in the Dakota hills, and Gage himself has been for many years giving Lincoln lectures while deftly molding a head of Lincoln from clay.

Frequent consultations were held with the Kazanjians and Dr. Gage before Maness started work on the features. Weeks and months went by but gradually a nose, mouth, eyes, hair began to take shape. Then a fracture developed near the nose and in correcting this the entire face had to be redone.

In adding the finishing touches to the features, it was necessary for Maness to use tiny wheels only 1/64 inches in diameter. Since the stone might have fractured if it were placed on any hard surface, he held the sapphire in one hand and the tiny drills in the other as he worked.

Finally on September 20, 1951 — almost two years after the work was started — the Kazanjians, Dr. Gage, and Norman Maness looked with satisfaction on the finished object.

During October the exquisitely carved stone has been in the Los Angeles or Beverly Hills stores of Brock & Company. Its next stop will be New York City and then on to other cities, including Springfield, Illinois, the Lincoln country.

"The stone is not for sale," James Kazanjian stated, "but we do plan eventually to place the entire series in some museum for permanent display. In the meantime, however, we feel so many more persons will be able to see and enjoy the Lincoln head if we permit it to be viewed in retail shops in the larger cities of the United States."

Kay Swindler

LARGE DIAMOND
RECOVERED AT
KIMBERLEY FIELD

The largest diamond, weighing 511¼ carats, ever found in the Kimberley area was recovered July 30 by digger J. Venter in the newly opened portion of the Nooitgedachts diggings in the Barkly West section.

The diamond, which is of fine octahedral shape, is described as "yellow (seventh color)" although another writer from the field states that it should more accurately be classed as being between a "yellow and by-water." The stone is said to be badly flawed with some internal cracks. One rather large spot and a cluster of fine ones appear slightly toward one point of the crystal.

The diamond is now being cut in Johannesburg and it is estimated that 40 per cent of the stone will be saved after cutting.

Although it is reported that the diamond crystal sold for slightly more than 35 pounds a carat, Venter will realize only around 8,000 pounds as his share. Ten per cent of the selling price goes to De Beers Consolidated Mines, Limited, as owner of the diggings and half of the balance to Venter's partner, E. J. du Plessis. The native who picked up the stone received a bonus of 200 pounds for the find, and a substantial sum will go to the government for income taxes.

The largest diamond recovered in the Kimberley section prior to this time was in 1896 when a 503¼ carat stone was reported.

This new section of the Nooitgedachts farm diggings was opened on July 2 and there are at present 161 claim holders registered. Several fair sized diamonds have been recovered since the opening including a 29¾ carat of fine silver cape, of irregular shape and slightly cracked. About one week after the recovery of the 511¼ carat diamond, L. J. Boshof found a 165¼ carat light cape diamond about 200 yards away. This stone is described as good quality with the "longish octahedral slightly imperfectly shaped on one side."

Kay Swindler

Gemological Digests

NEW DEVELOPMENT INCREASES RANGE OF EFFECTIVE HEAVY LIQUIDS

In the past few years a heavy media method of separation of ores from gangue has found increasing use in the mining industry. The extension of this method to the separation of diamonds from blue ground was reported in *Gems & Gemology* in the Winter 1951 issue.

Very recently R. P. Cargille have extended the range of possibilities of heavy media employing finely divided solids in liquids by using as the base liquid methylene iodide (density 3.32).

By using a mercury compound in suspension in the methylene iodide, Cargille can produce liquids with any density between 3.32 and 7.5. The finely divided media in suspension makes the resulting liquid opaque with a viscosity which increases with increasing density.

Although the liquids are not transparent and have a consistency, even in the lighter range, of thin mud, tests performed in the laboratories of the Gemological Institute have demonstrated that the liquids, if properly handled, add an effective means of specific gravity determination in the range above 3.32. When allowed to stand, the suspended media sinks to the bottom and thorough stirring is essential before use. Shaking to mix causes mistakes because the entrapped air reduces the density below expected figures.

While use of these liquids with suspended solids is not as simple as the use of usual transparent liquids, they do provide a valuable addition to the gemologist's laboratory, particularly since Clerici's solution is not presently available.

These liquids are available in a wide range of densities, including 3.55—a liquid in which diamond barely floats and in which zircon, sapphire, synthetic rutile, and synthetic spinel all sink; 4.05 — a liquid in which sapphire barely floats; and 4.72 — a liquid in which zircon barely floats and in which all other important transparent gemstones float more buoyantly. The liquids are available at $2.50 per 15 cc bottle through the Gemological Institute of America, Instrument Department.

Book Review

Fourth Edition *Mineralogy* by Edward Henry Kraus, Walter Fred Hunt, and Lewis Stephen Ramsdell. Reviewed by Richard T. Liddicoat, Jr.

The new Fourth Edition of *Mineralogy* by Edward H. Kraus, Walter F. Hunt, and Lewis S. Ramsdell, will be welcomed by mineralogists all over the world. In the fifteen years since the third edition was first published, it went through thirteen impressions. The new edition reflects not only the changes in the science of mineralogy since 1936, but also the decrease in the value of the dollar, since the new edition is $7.50.

The most important changes and additions in the book occur in the expanded and improved chapter "Crystal Structure and X-ray Analysis" which is set forth in the lucid fashion that has always characterized this valuable text.

Another hallmark of the earlier editions of this work—its excellent illustrations—has been improved and increased in number. In addition to the modernization and revision of mineral identification tables, a selected bibliography has been added. This text has long been considered to be particularly valuable to the mineralogy student and its value in the study of this science has been enhanced by the changes in the new edition.