Guide to Australian Gemstones

Reader's Digest

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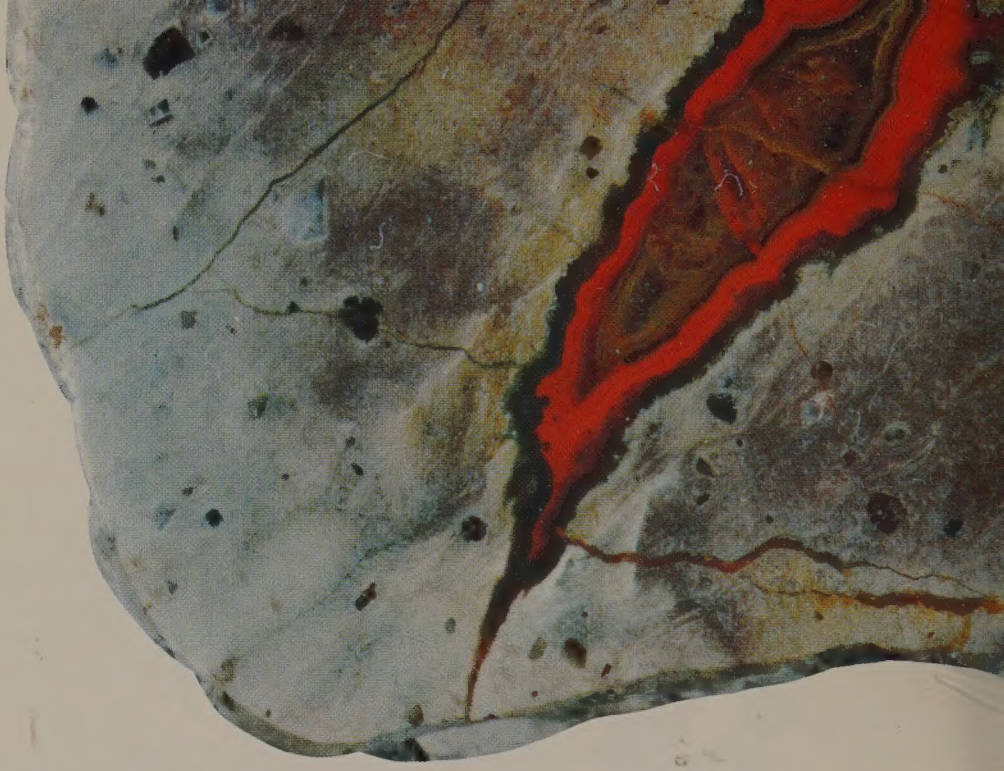
Reader's Digest Sydney



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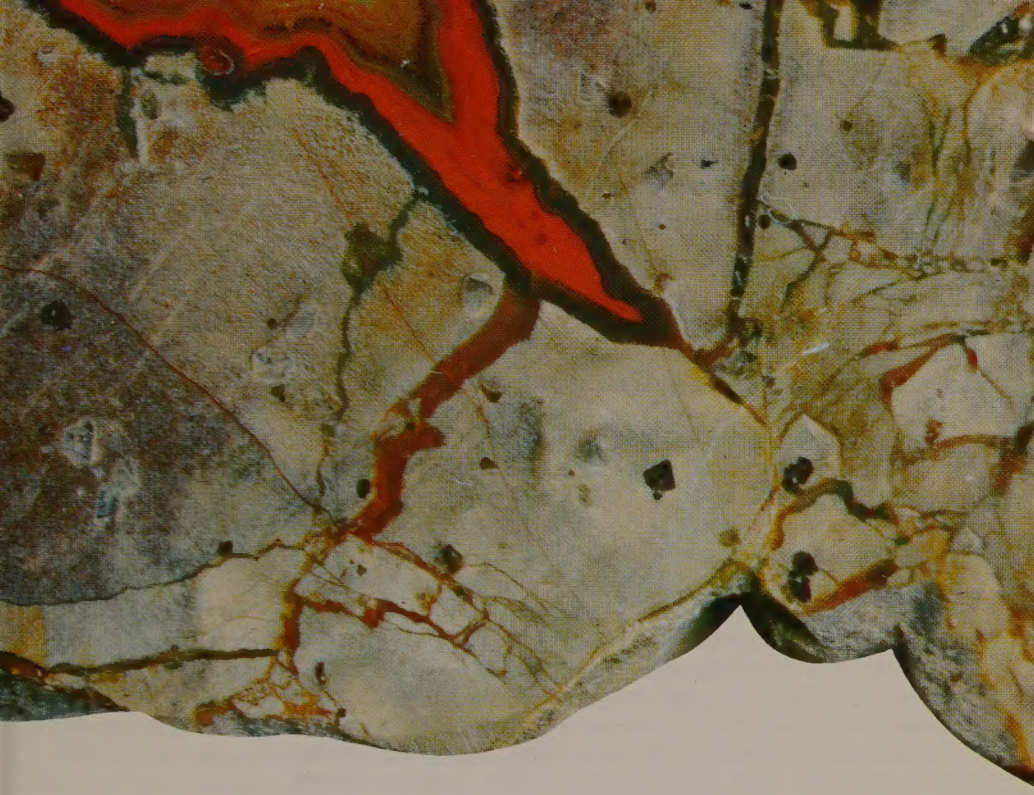
Gemstones and gem minerals come in many beautiful forms. On the front cover are colourless crystals of quartz, on the title page is a facet-cut citrine and above is a polished thunder egg of agate.



Contents

What are gemstones?

In the minds of many people the mention of gemstones evokes a vision of a pirate's treasure chest overflowing with diamonds, rubies, emeralds, gold and silver chains and strings of pearls. But the actual definition of a gemstone is more complex than this simple image.

In the first place, all gemstones are minerals and pearls are not even minerals, let alone gemstones, beautiful though they may be. Minerals are substances formed by inorganic processes of nature, whereas pearls are formed by living creatures, oysters. Nor are gold and silver gem minerals—they are precious metals.

In general, gemstones are special varieties of minerals that possess sought-after qualities of durability (hardness), colour, transparence, pattern and, in some cases, rarity. Of the more than 3000 types of minerals in the mineral kingdom only about 100 are regarded as commercial gems.

Gemstones used to be classified by the outmoded terms 'precious' and 'semi-precious'. Now they are known as gem minerals and ornamental minerals. Gem minerals are the transparent branch of the family, possessing beautiful colour, brilliance and 'fire'. They are cut in facets to show off these qualities—which are not revealed until the stones are cut.

Ornamental minerals, on the other hand, depend on colour and pattern for their attractiveness. They include agates, chrysoprase, jasper, prehnite and rhodonite. They are cut in polished slabs and rounded polished forms known as cabochons. The general term *gemstone* is technically applied to any cut stone, whether it be a polished slice, a translucent cabochon (a polished but uncut stone) or a transparent, facet-cut stone. There are exceptions to these two categories—precious opal, turquoise and jade are regarded as true gem minerals and not ornamental minerals.

Many minerals occur in both common and gem varieties. The beryl family includes the gemstones aquamarine and emerald. But common green, yellow or brown opaque beryl, which is found in large quantities in many areas and is a source of the metal beryllium, is not generally regarded as a particularly attractive ornamental mineral.

Gem minerals are widely distributed over the surface of Australia, but some areas, because of different geological history, are more favoured than others. In assessing particular areas therefore, it is useful to have some basic knowledge of geological structures.

The crust of the earth is made up of three main groups of rocks, named for the manners in which they were formed. They are igneous, sedimentary and metamorphic rocks.

Igneous rocks are formed by the solidification of molten masses of the crust of the earth. They are referred to as primary, since when the earth was originally formed its entire crust was molten. Igneous rocks are mixtures of minerals such as quartz, which itself is the most common of all minerals, and members of other groups of silicate minerals including

feldspar, olivine, pyroxene and mica. Rapid cooling of the molten masses causes the formation of fine-grained rocks such as basalt, in pockets of which tough, micro-crystalline minerals such as agate are later formed. Slower cooling produces coarse-grained rocks, including granites, in which minerals form in cavities, often in the form of large crystals.

Sedimentary rocks are formed from fragments of other rocks, or consist of masses of chemically precipitated minerals, or they can be formed by living organisms, either plant or animal. As they are formed from existing rocks they are known as secondary. Their mineral makeup consists of various forms of silica, notably quartz and chalcedony, clay minerals, calcite, iron oxides and, more rarely, masses of one type of mineral such as water-soluble chlorides, nitrates or phosphates. In Australia sedimentary sandstones, in certain areas and under certain conditions, are the source of precious opal, including the famous black opal of Lightning Ridge.

Metamorphic rocks are formed by the alteration of rocks already in existence, by heat or pressure or both. The heat and/or pressure changes the original rock minerals to new ones, which are distinctive. The common minerals of the metamorphic group are members of the mica and garnet families, the aluminium silicate minerals, kyanite, sillimanite, andalusite and, in some cases, quartz and serpentine.

Gemstones are present in solid rock as groups of crystals in crevices and cavities or, as minerals, like the chalcedony group, filling rounded cavities in basalt. Great care has to be taken, using hammers, gads and chisels, to get them out intact, and breaking rocks is hard work.

The most abundant source of gem minerals is stream gravel deposits, where waterworn fragments are found. This applies only to eastern Australia and not to the riverless regions of central and western Australia.

'Stream' gravel areas can be modern or ancient. Gravel is formed by the breaking down of the parent rock through the ages by the natural forces of wind and water. Precious material can be found in ancient gravel beds that have since been buried by movement of the earth's crust, in old glacial moraine beds, in the pebble beds of modern young streams or on the pebble beaches of the coast.

Because true gem minerals—but not ornamental gemstones—are hard and tough by nature, they survive the process of weathering while the parent rock surrounding them turns first to gravel and then to soil.

Like gold, they collect in the crevices in bends in streams and can be picked out by panning, or sieving (see *The collector's gear,* p 46).

Often in hunting gemstones one find will lead to another, 'companion' mineral. A trace of chalcedony in basaltic country could point to the discovery of agate, jasper, carnelian or bloodstones; zircons might indicate the presence of sapphires; wolfram could mean topaz or beryl and, in a district where tin has been mined, the collector might discover quartz crystal, topaz and beryl.

Starting a collection

Collecting gem minerals and ornamental minerals is attracting the interest of a growing number of Australians and in recent years has become something of a 'boom' hobby. Although the beauty of ornamental mineral stones was recognised in previous centuries, particularly the nineteenth, they fell from fashion at the beginning of this century and it is only comparatively recently that they have been recognised again.

Interest in gem mineral collecting was renewed in the United States and rapidly spread to other areas of the world. The hobby has been enthusiastically received in Australia, mainly because of the wealth of gem mineral material that is available. Australia still has vast areas which have not been fully explored or prospected. In addition, many now-fashionable gem minerals were passed over by early prospectors as being of no commercial value.

Although gem minerals can be bought from specialist shops and mail-order firms, for most people the thrill of collecting begins with doing their own fossicking—which can range from a day's expedition to a pleasant stream where one can pick over pebbles to a holiday in the interior or a camping trip to known gemfields.

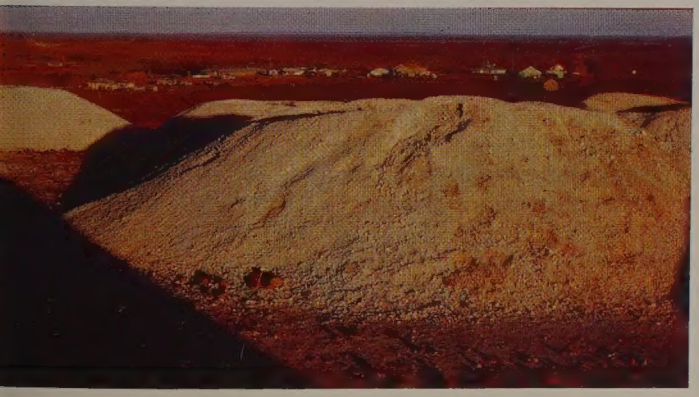
Many collectors of gemstones like to keep their specimens 'in the rough', but others go on to cut, polish and mount their stones and to the equally rewarding hobby of making jewellery, or lapidary work.

The collector can specialise in a particular family of gem minerals or undertake broader geological study.

The amateur collector also can add to the geological knowledge of the Australian continent. Museums and universities are always interested in new mineral and fossil finds and the indentification and location of meteorites. Many important discoveries in Australia's geological and evolutionary history initially have been made accidentally by professional prospectors seeking their fortune, or by amateurs fossicking for ornamental stones.

In starting a collection of gemstones the beginner also will find that more experienced collectors are ready with advice and assistance on the field.

***Amethyst**—this crystal comes from Wyloo, inland from Onslow, WA (map p 37) and in the general area of the basin of the Ashburton River. The first finds were made in the area many years ago, and new and important deposits have been found in more recent years.*



A view of the White Cliffs opal fields (map p 36), looking from the area of old opal dumps. Precious opal is Australia's best known gemstone.

Gem and ornamental minerals

In the following list italic type indicates a cross-reference to another entry. An asterisk indicates that there is a photograph of the stone in pp. 14-33.

Agate* A variety of *chalcedony* with concentric bands. Agate nodules freed by weathering of volcanic rock are found lying loose on the surface in most of Australia's agate fields. Specimens from Agate Creek, Qld, are very beautiful. Blue-grey agate is also found in considerable quantities at Monto, Qld. Waterworn pebbles of agate are found in Victoria in the alluvial gravels of the Beechworth area and in the streams of the Dandenong Ranges, near Melbourne. An attractive variety, with white bands standing out against a delicate violet pink background, is found at Therribri, 15 km northeast of Boggabri, NSW.

Amethyst* Purple variety of *quartz.*

Aquamarine Blue and green varieties of *beryl.*

Beryl* This important group of minerals includes two notable gem varieties, aquamarine and emerald. Aquamarine is quite flawless, transparent and sea green or sea blue in colour. Emerald, which is deep grass green, is the rarest and most valuable variety of beryl. In almost every case its transparency is marred by flaws.

Chalcedony A general name for all *silica minerals* of the cryptocrystalline variety. Chalcedony consists of dense masses of closely packed fibrous quartz. It is widely opaque to translucent and seldom, if ever, transparent. It has a waxy lustre and is always light in colour—milky, grey-blue or pale yellow.

Chert An opaque pale yellow or fawn variety of *chalcedony.* It is found among a variety of loose-lying fragments in and among other siliceous material over large areas of the arid regions of northwest New South Wales, southwest Queensland and northern South Australia. Chert is formed by the breaking up by weathering of layers of siliceous rock deposited by ground water on the surface of the low-lying areas. Much chert is found on the gibber plains and stony deserts of the inland. The Aborigines made artefacts from it.

Chiastolite* Opaque crystals with cross-shaped inclusions.

Chrysoprase* The most valuable variety of *chalcedony.* The most important deposit is at Marlborough, Qld. Similar occurrences of chrysoprase are found in weathered serpentine in Western Australia, close to important nickel areas. Important fields are Comet Vale, north of Kalgoorlie, Yundamindera, southeast of Leonora, and Wingelinna, where it is found in association with *citron chrysoprase.*

Citrine* Yellow-brown variety of *quartz.*

Citron chrysoprase Magnesite.

Cordierite* Also known as iolite. It is not a common gem mineral in Australia and it is only in the past few years that gem quality specimens have been discovered—in the Mary Kathleen district of Queensland.

Diamond Until recently, very few gem-quality diamonds had been found in Australia. The most important diamond areas were in the central highland and New England districts of New South Wales where they occur as small waterworn grains in ancient, well-cemented stream gravels. Recently, however, very large deposits have been discovered in the Kimberley region of Western Australia in stream gravels and in the original host rock. These deposits are currently being developed for large-scale mining and are not accessible to collectors.

Emerald* Green variety of *beryl*.

Garnet Found as waterworn fragments in stream beds. Gem material is usually red and can be confused with ruby-pink *sapphire* or *zircon*. It is mainly sieved from the stream gravels of the Hale and Maude Rivers in the Harts Range, NT, and at Proston, west of Gympie, Qld.

Iolite Another name for *cordierite*.

Jade* Compact, durable, tough mineral; mainly green.

Jasper* This name covers a range of ornamental *silica minerals*. Jasper is not a homogeneous form of silica like *chalcedony* and *quartz*. In general jaspers form through the silicification of fine-grained sedimentary rocks, such as shale, limestone and fine-grained sandstone. Jasper is always completely opaque and may be red, yellow, brown or black, or mottled. It resists weathering and stands out in hard bars. These are found throughout the eastern highlands.

Jaspilite* The great iron ore deposits are associated with the banded jaspilites, which consist of alternating layers of red *jasper* and black *hematite* (iron oxide). Jaspilites are abundant in Western Australia, in the Hamersley Range, at Mt Bruce, 50 km from Wittenoom and at Mt Goldsworthy, 95 km east of Port Hedland.

Magnesite* Also called citron chrysoprase.

Malachite* Green copper carbonate. Massive banded forms sought as a medium for carving.

Moss agate Translucent *chalcedony* that has fern-like inclusions of brown iron oxide or black manganese oxide.

Moss opal Translucent common *opal* that has fern-like inclusions of brown iron oxide or black manganese oxide.

Onyx A straight-banded variety of *chalcedony*.

Opal* One of the three groups of *silica minerals*. There are precious and common varieties. The principal fields where precious opal of sedimentary origin is mined are shown in the map on p 36. It is not merely coincidence that precious opal has formed in semi-desert inland regions of Australia. Twenty-five million years ago, when Australia had been worn down to a vast featureless plain, the rising and falling of the level of ground water dissolved silica, which remained in solution. When the land began to become arid, the water table fell and some of the silica solutions became trapped in cavities in sedimentary rocks. Undisturbed over a long period, the solutions became concentrated until the silica settled out in a jelly-like mass. Tiny spheres of silica of uniform size sank to the bottom of the cavities and hardened, forming precious opal.

Exactly the same process takes place when silica-rich

Hydraulic sluicing for cassiterite ore of tin at Copeton, south of Inverell, NSW. The heavy tin mineral and occasional diamonds concentrate in the channel.

solutions are associated with volcanic activity. Although precious opal has undesirable features, such as cracking and crazing, and has relatively low hardness, the best quality stones place it among the most desirable gem minerals.

Common opal, sometimes called opalite, is very abundant. Also known as potch, it is associated with precious opal on most of Australia's opal fields. It has no play of colours and is usually opaque, though it is sometimes translucent or transparent. It may show any colour and any tint from pale to deep. It has a characteristic resinous lustre. It is often brittle and breaks with a splintery fracture. It is not suitable for cutting.

Common opal and the opalised form of *petrified wood* are found in basalt country in Queensland at Rolleston, Mantuan Downs and Baralaba. Some of the opalised wood is in the form of quite large logs. In New South Wales, pale green translucent common opal is found at Delungra, 50 km north of Inverell, and green transparent common opal 7 km north of Hanging Rock. Light brown opalised wood is found at Copeton and at the Black Jack colliery near Gunnedah.

In Victoria, common opal is found at Beechworth. Opalised wood is found on Flinders Island, in Bass Strait.

In Western Australia, common opal often occurs as veins in completely weathered serpentine and since this is also the environment for economically important nickel deposits, common opal thus pigmented can be a guide in nickel exploration. Localities for green common opal include Gabanintha, Belele, Poona, Rothsay and Westonia. Translucent rich red common opal is found at Mundiwindi and at Jutson Rock, 40 km northwest of Laverton. Opaque golden yellow material is found at Spargoville, 50 km south of Coolgardie, and at Norseman. *Moss opal* is found in the western and central provinces and opalised wood in the vicinity of Albany, Cranbrook, Gnowangerup and Ongerup.

Petrified wood Silica solutions may penetrate wood and convert it into a dense mass of silica, in the form of *chalcedony*, fine-grained *quartz* or *opal*. The original structure of the wood—its cells, growth rings, knots and bark—are retained. Petrified wood is found in many areas in eastern Australia. Fragments can be found along the beach at North Wollongong, NSW.

Prehnite* Found in the Northern Territory and at Prospect, near Sydney, NSW. One of the best prospecting areas for this mineral is at Wave Hill, NT, where nodules weathered out of basalt are found on the ground.

Quartz* One of three groups of *silica minerals*. It is transparent, with a vitreous, or glassy, lustre. Amethyst is the purple variety, citrine the yellow-brown variety and rock crystal the colourless variety.

Rhodonite* Occurs in massive ornamental forms and also as transparent crystals that can be faceted.

Ribbon stone A grey, fawn or brown banded *jasper* which occurs on the Barkly Tableland, NT, and in adjacent Queensland. Two good localities, on the Barkly Highway, are at Anthony Lagoon, near Avon Downs, and Camooweal.

Gold—*one of the earth's most prized metals, although not a gemstone. Australia has produced some of the world's largest gold nuggets, but examples such as this are now rare. This specimen of gold in quartz was found at Kanowna, in the Kalgoorlie district of Western Australia (bottom map p 37)—one of the many fabulously rich gold-bearing areas of that State.*

Rock crystal Colourless variety of *quartz.*

Ruby The red gem variety of corundum (aluminium oxide).

Sapphire* Blue gem variety of corundum, which is aluminium oxide; ruby is the red variety. After precious *opal*, sapphire is Australia's most important gemstone. It has been brought to the surface by eruptions of molten lava that solidified to form basalt, which covers large areas of the eastern highlands. Weathering has released the sapphire from the basalt, and the gemstones are concentrated in stream gravels. Rubyvale, near Anakie, Qld, is the centre of one big producing field. The general area between Glen Innes and Inverell in northern New South Wales is the other big commercial field. There are many sapphire-bearing stream gravels throughout the basalt country. In New South Wales, Oberon, Grabben Gullen and Tumbarumba are regarded as being the most productive areas; in Victoria, Beechworth, Rutherglen, Daylesford and the Dandenong Ranges; in Tasmania, the general area of Mt Cameron and Gladstone in the northeast.

Sardonyx A red and white banded *chalcedony* of the *agate* or *onyx* variety.

Silica minerals There are three groups of these, the most abundant minerals in nature. Crystalline silica, or *quartz,* includes amethyst, citrine and rock crystal. Cryptocrystalline silica, or *chalcedony,* includes *agate, chert, chrysoprase, onyx* and *sardonyx.* Opaline silica includes common and precious *opal* and opalised wood.

Some distinctive silica minerals are found only in Western Australia and South Australia, where there are extensive rock formations that are much older than the rocks of the eastern regions. These include *jaspilite, siliciophite* and *tiger eye.*

Pebbles of practically all the silica minerals are numerous in the streams of the eastern highlands. Common varieties, such as common opaque quartz, chalcedony, *petrified wood* and *jasper* are widespread in the Murray-Darling river system. They are also found in the inland drainage system, including the Georgina River in far western Queensland and Cooper Creek in the region of Innamincka, SA.

Siliciophite* When opaline silica impregnates asbestos this hard green or yellow stone is formed. The finest examples come from Lionel, south of Marble Bar, and Byro, between Meekatharra and Carnarvon, in Western Australia.

Thunder egg* A hollow stone with *chalcedony* inside.

Tiger eye This outstanding ornamental *silica mineral* is restricted to Western Australia and is found around Mt Brockman in the Hamersley Range. Oxidation has caused veins of blue crocidolite asbestos to turn a beautiful golden brown or, sometimes, a brilliant red. Impregnation by silica solution has hardened the asbestos but the fibrous structure remains. In reflected light the stone has a curious lustre that is called chatoyant (cat-like) because of its resemblance to a cat's eye. Sometimes thin black layers of hematite occur with the silicified golden brown and red tiger eye and even remnants of the original blue colour may be present.

Topaz* Fine quality topaz is found in the Oban River area,

NSW. Good quality gems are also found in the form of superb blue crystals and waterworn pebbles in a deep lead (the ancient gravels of a buried stream bed) at Mt Surprise, 50 km north of Einasleigh in north Queensland. Farther to the east, on the Atherton Tableland, large colourless transparent crystals have been discovered at Innot Hot Springs, near Mt Garnet. Both of these fields are fairly recent discoveries. In Western Australia, blue transparent topaz in pegmatite at Melville, 245 km east of Geraldton, and at Grosmont, near Coolgardie. Streams are virtually non-existent in these arid regions, so waterworn pebbles are not found. In Tasmania, waterworn pebbles and crystals of colourless to pale green topaz of gem quality are found at Killiecrankie Bay, Flinders Island.

Tourmaline Crystals of transparent tourmaline, a very attractive gem mineral, have been found in pockets of clay derived from the weathering of granite on Kangaroo Island, SA. Some crystals show adjoining zones of transparent pink and green and are popularly known as watermelon tourmaline.

Turquoise One of the few opaque gemstones regarded as a gem mineral. It owes its attraction to its beautiful blue colour, which makes up for its softness and porosity. Turquoise occurs as thin veins in black slate inland from Narooma and Bodalla, NSW, and in Victoria in the Edi-Myrrhee district, 40 km southeast of Benalla, near the King River. There are commercial quantities in the Northern Territory at Ammeroo Station on the Sandover River, 415 km northeast of Alice Springs. The turquoise occurs there as veins in sedimentary rocks.

Variscite* Massive green aluminium phosphate.

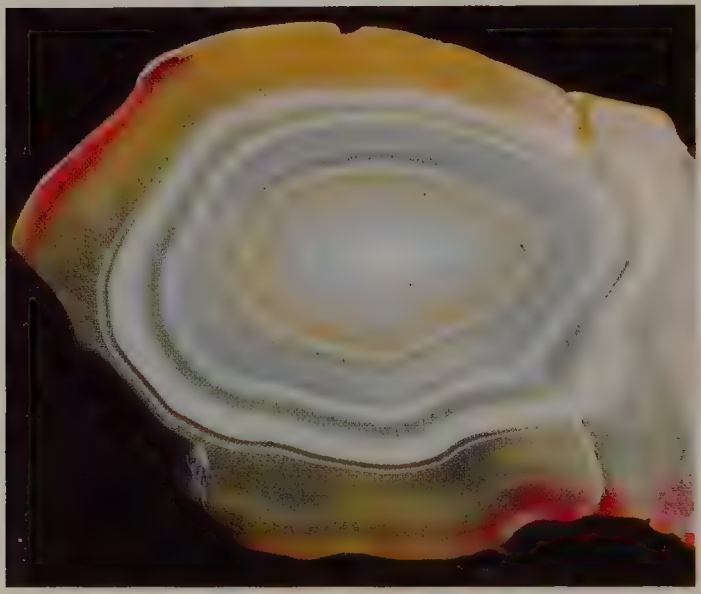
Zircon* The best quality gem zircon yields quite large cut stones, slightly yellow in appearance and showing great brilliance and flashes of colour. The outstanding zircon area in Australia was the Strangways Range, 80 km northeast of Alice Springs. The first discovery was made there in the 1940s and the area supported a small zircon gem-cutting industry for some years, but it gradually became worked out.

Small waterworn grains of brown-pink zircon are common in many stream gravels throughout the eastern highlands, including the highlands of Tasmania. In Queensland, many stones have been faceted, including some as large as five grams. Transparent zircons are associated with sapphires in the Anakie diggings of central Queensland.

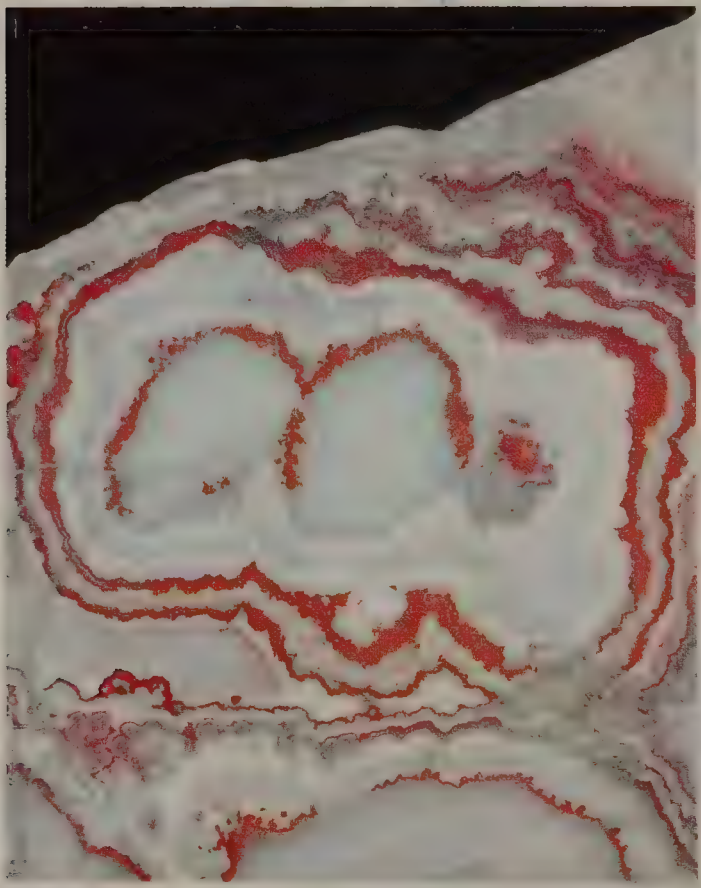
In the southern New England tableland, NSW, cinnamon-brown waterworn zircons are found in a wash consisting largely of basalt soil in gutters at several places along the Hanging Rock-Niangala Road. In northern New England, fine faceted stones have been cut from large dark red waterworn fragments found 18 km southeast of Oban. Red zircon in the form of small waterworn fragments and crystals is found in the gravels of the Rocky River, Uralla. At Apple Tree Gully, 25 km northeast of Inverell, perfectly transparent pale yellow zircon crystals have been discovered. In the Glen Innes-Inverell district, zircon is recovered from sapphire-washing plants.

Working opal dumps at Lightning Ridge, NSW (map p 36) is not for the inexperienced. The dirt is shovelled into rotating perforated drums, driven here by an old car. The dust flies out and the rock and perhaps pieces of precious opal remain.

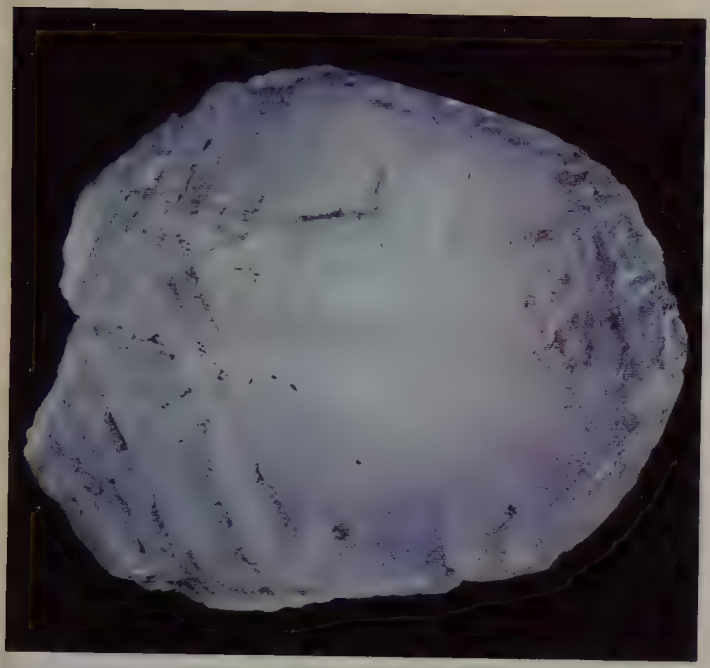
Gemstone identification



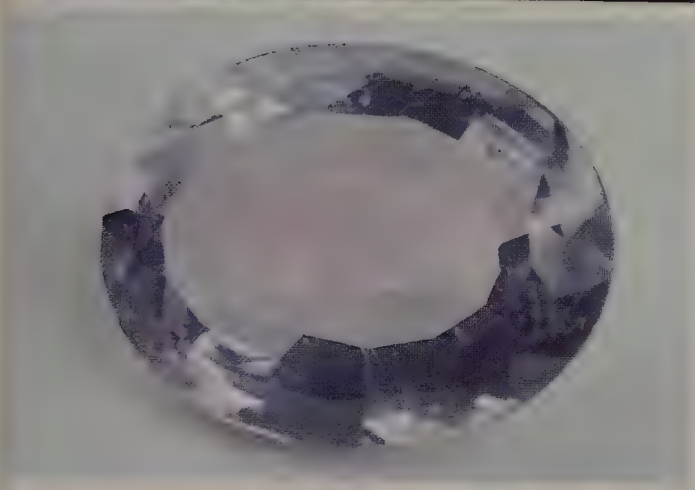
***Agate**—a banded variety of chalcedony, a general term that covers all cryptocrystalline varieties of silica. It usually occurs as fillings in basaltic cavities. This specimen is from Queensland's Agate Creek area (top map p 40), which produces some of the world's finest stones.*



***Agate**—a red and white specimen from White Rock, Drake, NSW (map p 41, top map p 42). The weathering of basalt very often leaves nodules of agate lying loose on the surface. The nodules are sawn into slices to reveal their full beauty.*

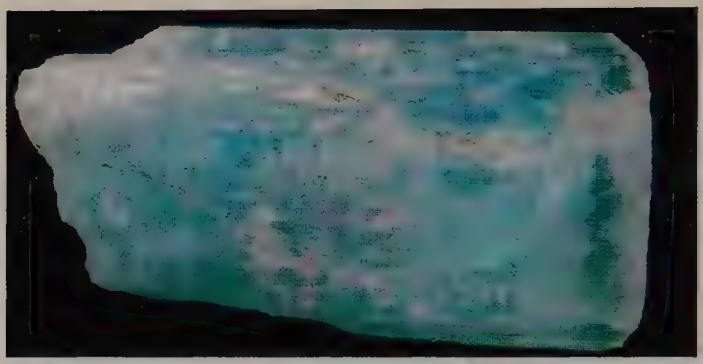


Amethyst—*a variety of quartz, which in itself is the crystalline variety of silica. It is the most valuable of the quartz varieties because of its beautiful purple colour. This stone is a large crystal fragment from Emmaville in the New England district of New South Wales (top map p 42).*

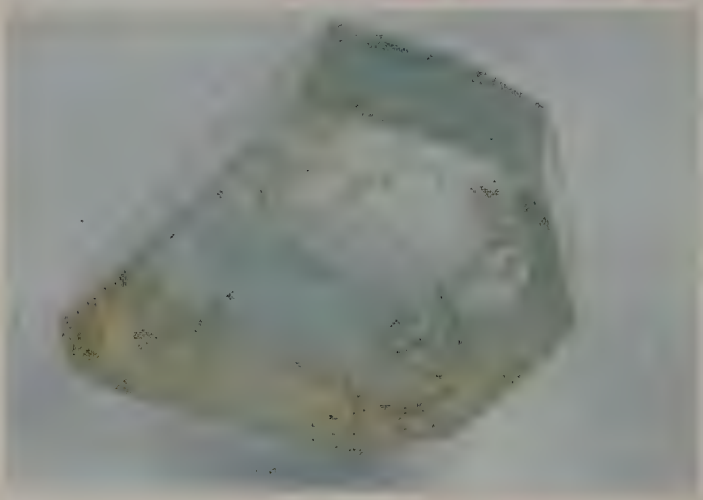


Amethyst—*a faceted or cut amethyst weighing 8 g. It was cut from a water-worn pebble from the stream gravels of the Oban River, east of Guyra in the New England district (top map p 42).*

Amethyst—*a beautiful group of deep purple amethyst crystals from the Wave Hill district in the Northern Territory (map p 38).*



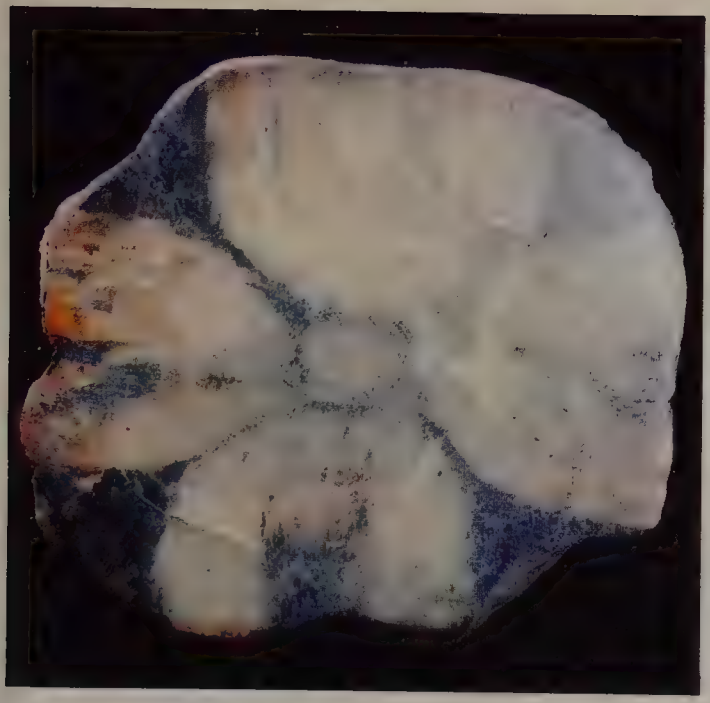
***Beryl**—green beryl crystals occur in association with wolframite, important as a source of tungsten. This uncut crystal comes from Heffernan's mine, Torrington, NSW (top map p 42).*



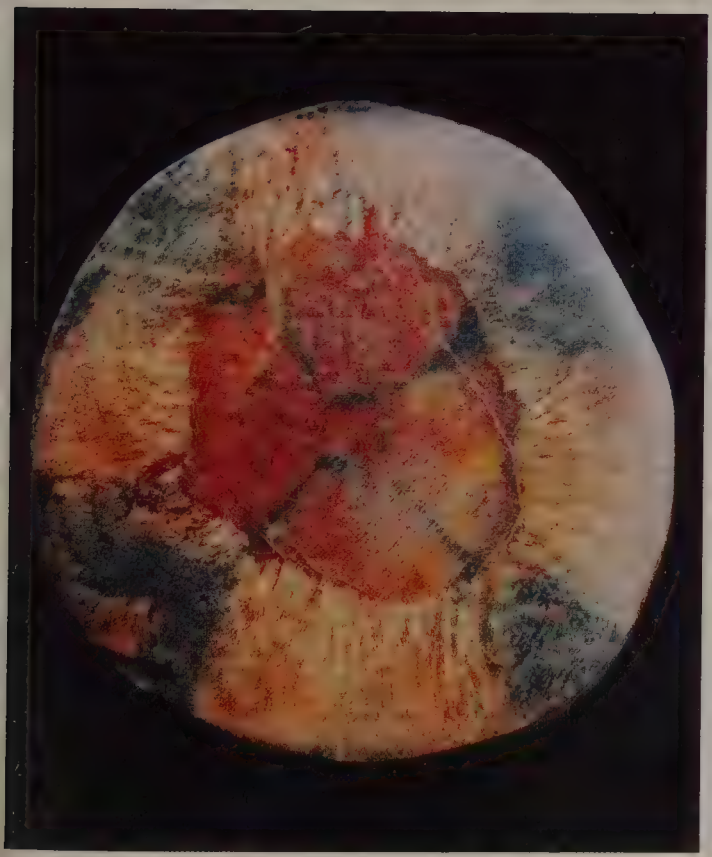
***Beryl**—a crystal of aquamarine beryl, the gem variety, also from Heffernan's mine, Torrington.*

***Beryl**—a faceted stone from Heffernan's mine. The depth and clarity of true gem minerals is not evident until they have been cut. Faulty faceting can ruin a perfect stone.*

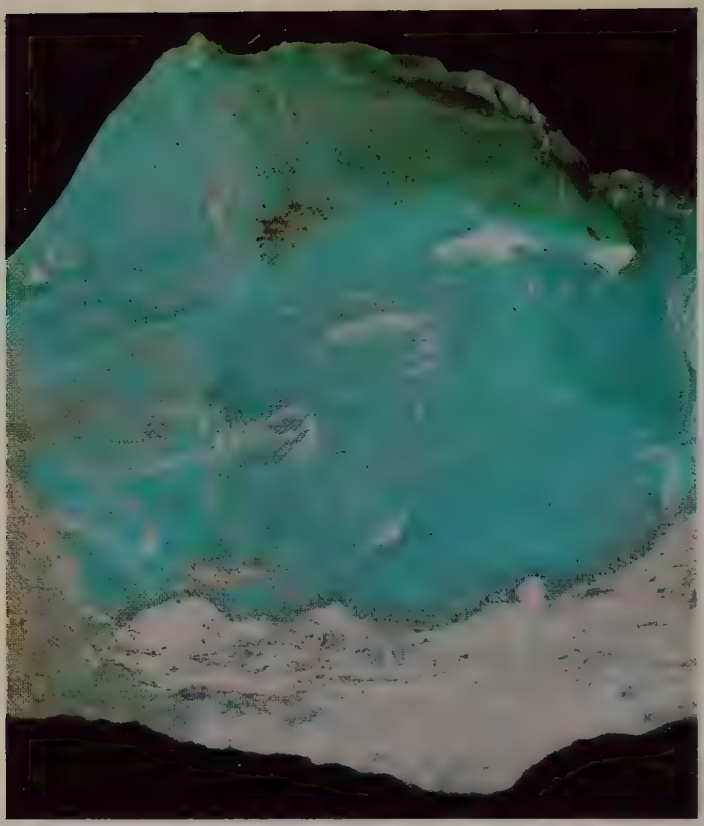
***Beryl**—a crystal of heliodor, the golden variety of beryl, from the Torrington district, NSW.*



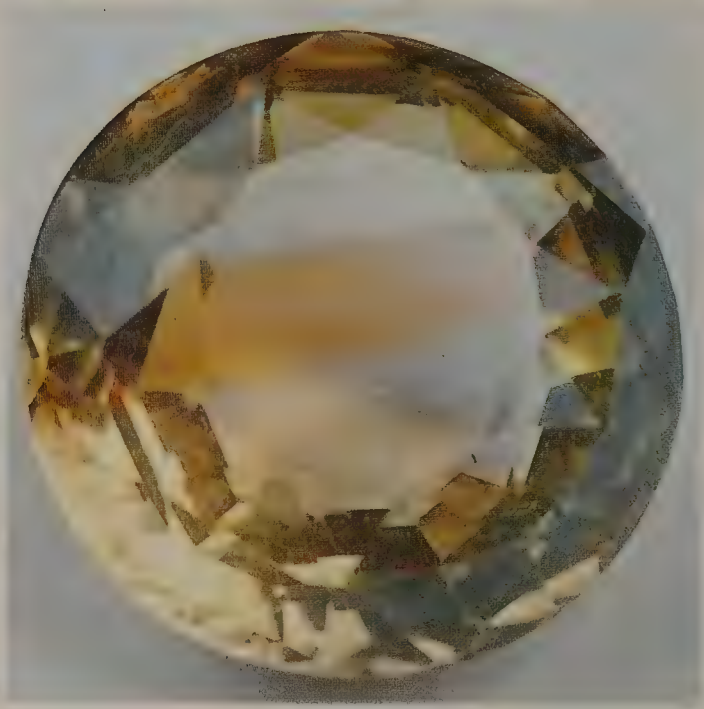
***Chiastolite**—a gem mineral found on the ground in cigar-shaped crystals at Bimbowrie, SA (map p 39). When cut, a cross-like structure is seen.*



***Chiastolite**—another variety of the stone, once used for watchchain decorations and known as 'Australian lucky stone'. Also from the Bimbowrie district, SA.*

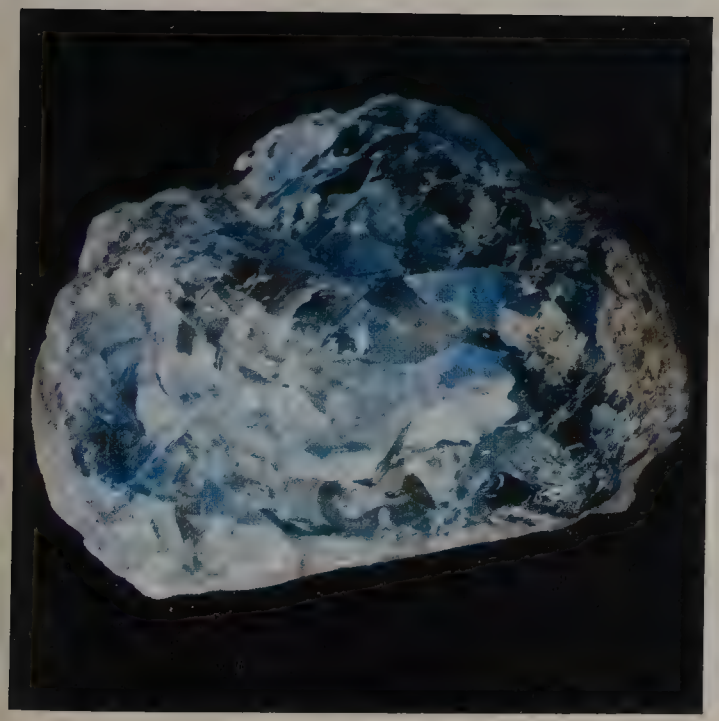


Chrysoprase—*the most valuable variety of chalcedony. This specimen comes from the most important deposits in the world at Marlborough, Qld (bottom map, p 40).*

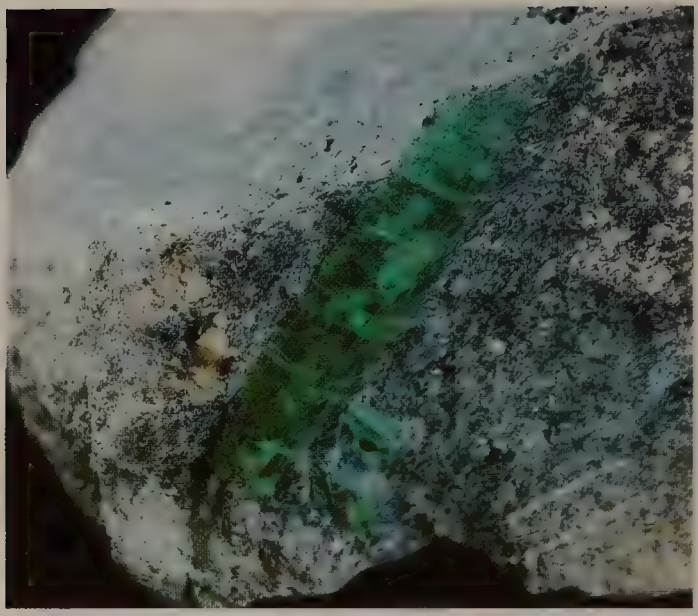


Citrine—*the yellow-brown variety of quartz. This faceted stone comes from the Oban River, east of Guyra in the New England district of New South Wales (top map p 42).*

***Citrine**—large gem quality rough of citrine found in New England, NSW (maps p 42).*



***Cordierite**—a common mineral found in highly altered metamorphic rocks, although only in fragments of microscopic size. Gem quality masses the size of this specimen are rarely encountered. This example was found in rugged semi-desert country in the Harts Range to the northeast of Alice Springs (map p 38).*



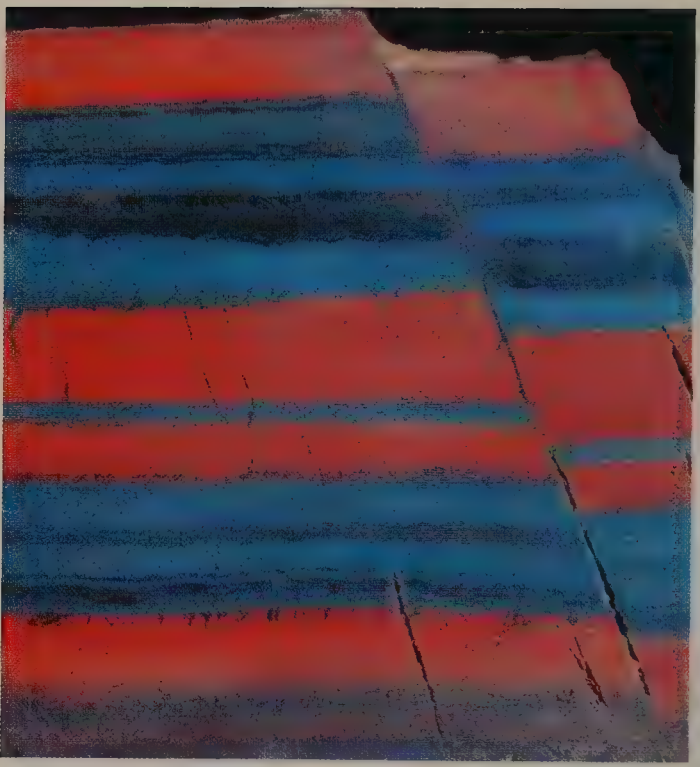
***Emerald**—one of the most prized and rarest gem varieties of beryl; emerald is in great demand as a gemstone. This specimen comes from Poona, northwest of Cue, WA (bottom map p 37).*

***Jade**—the nephrite variety. The other variety is jadeite. They are different in composition, but they both have a microscopic structure consisting of a dense mass of interlocking needle-like crystals.*

***Jade**—a paler variety of nephrite. Jade does not chip easily. It is an ideal medium for intricate carvings. Both this and the preceding specimen were cut from a deposit in the Dungowan district, southeast of Tamworth, NSW (bottom map p 42).*

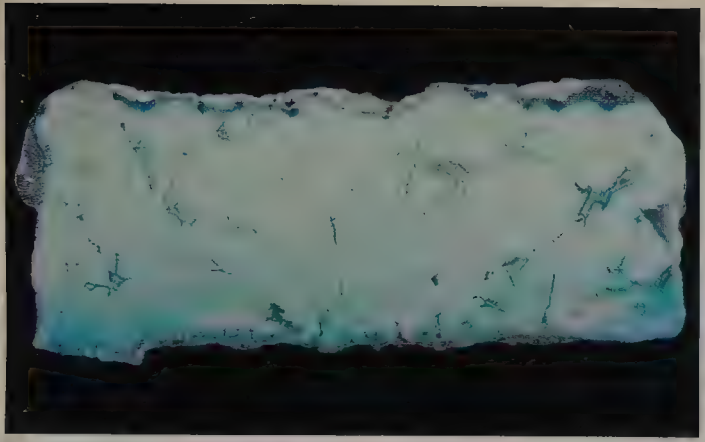
Jasper—*formed from silica, the most common chemical in the crust of the earth. Once dissolved in water it percolates through fine grained rocks and is precipitated in their pores, forming a hard dense mass, often banded, known as jasper. This polished banded specimen comes from the Abercrombie River at Tuena, NSW (map p 45).*

Jasper—*a specimen from one of the hottest places in Australia, Marble Bar in Western Australia (top map p 37). A large wall-like mass forms a bar across the Coongan River at Marble Bar and was first mistaken for marble—hence the name of the town.*



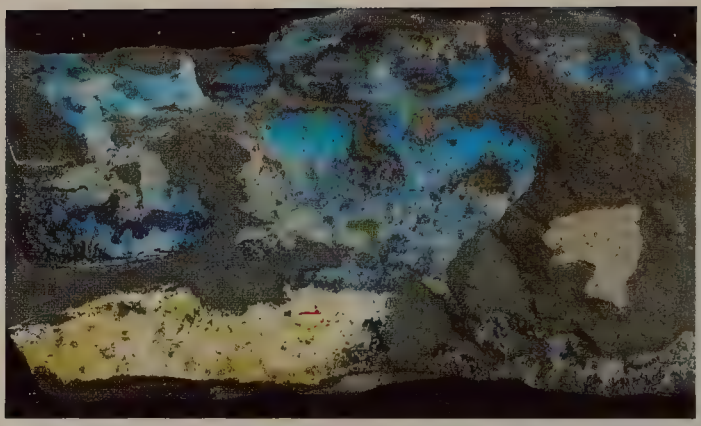
Jaspilite—*this is a very common ornamental mineral found in the central and western areas of Australia. It consists of alternating bands of jasper and black hematite, which is an oxide of iron. This specimen comes from Sandstone, 160 km east of Mt Magnet, WA (bottom map p 37).*

Jaspilite—*a specimen from Iron Duchess, 80 km southwest of Whyalla, SA (map p 39). It is associated with iron ore deposits of great economic importance in the Middleback Range.*



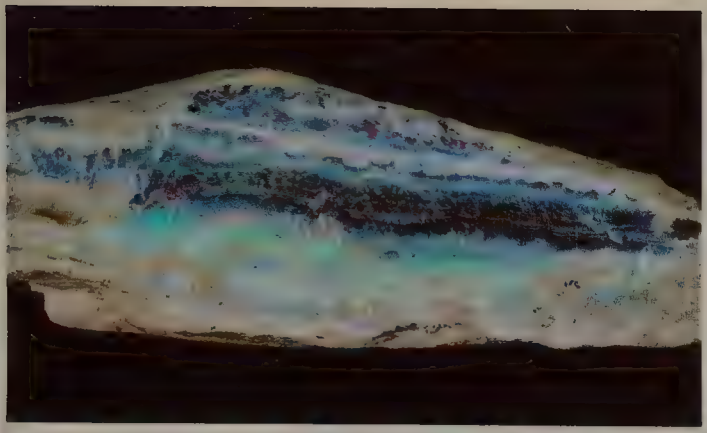
Magnesite—*a polished specimen of partly silicified magnesite coloured by a trace of nickel compounds. It is known in the trade as 'citron chrysoprase'. Found at Wingelinna, a very remote area of far eastern Western Australia (map p 38).*

Malachite—*this nodular, massive and polished specimen comes from Burra, SA (map p 39). Although it is not the principal copper ore, malachite is an important source of the metal. Copper mining began at Burra in 1845, one of the earliest metal-mining ventures in Australia. Malachite is one of the most valuable ornamental minerals.*

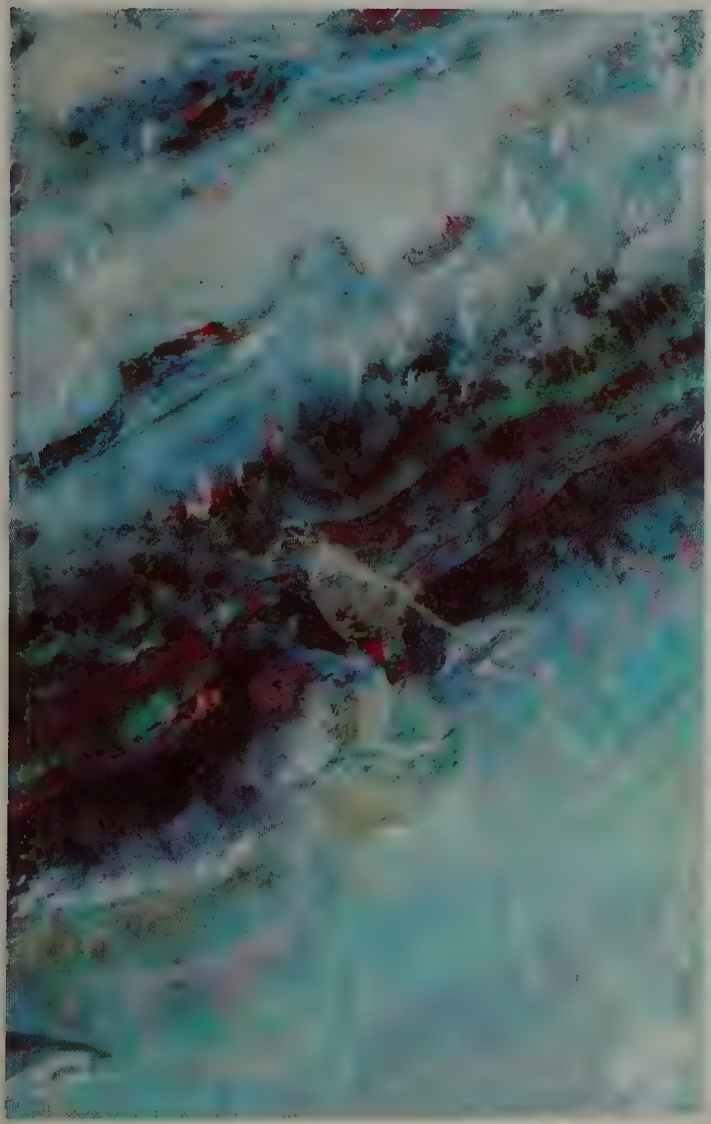


***Opal**—a sample of precious opal forming a coat on iron-bearing sandstone. The brown colour of the sandstone matrix is due to the presence of iron compounds.*

***Opal**—a microscopic picture of an opal specimen from the Queensland fields (map p 36).*

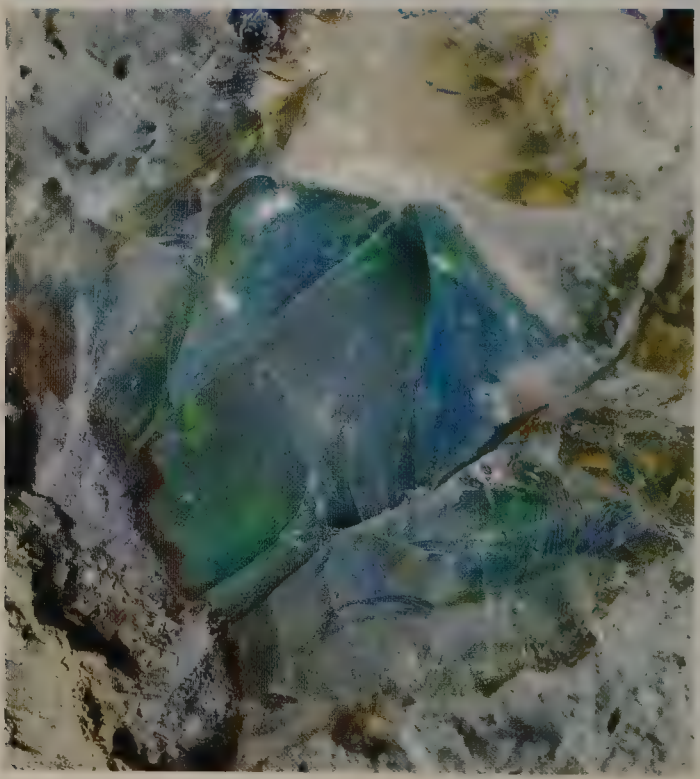


Opal—*a specimen of precious opal from the White Dam area of the Andamooka opal fields, SA (map p 36). Precious opal is Australia's most important gem mineral.*

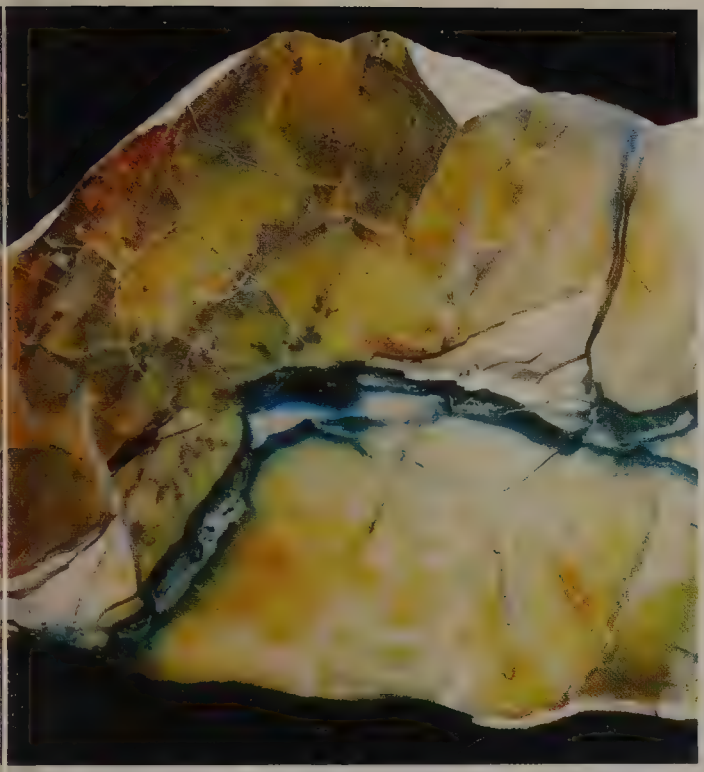


Opal—*a close-up of the face of an opal. All the economically important opal fields are in the arid inland of Australia. Both the common and precious varieties of opal are deposited by ground water rich in silica in sedimentary rocks, usually at the junction of a white siltstone or a claystone that is virtually impermeable and retains water to such an extent that the rock is permanently damp.*

***Opal**—a facet of an opal gem. The brilliant flashes of colour characteristic of precious opal are due not to pigmentation, but to the breaking up of white light into its component colours. This optical effect is caused by the internal structure of precious opal, a regularly stacked array of tiny silica spheres of equal dimensions. This structure is so minute that it can only be seen through an electron microscope.*

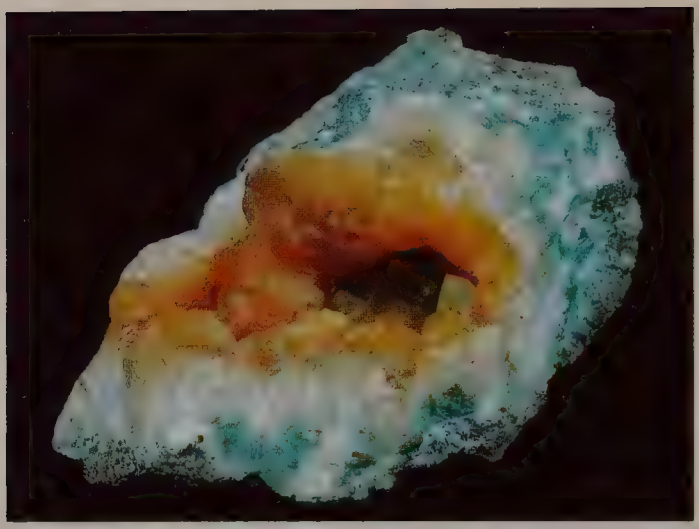


***Opal**—some precious opal is deposited by silica solutions that accompany volcanic activity. There are only a few places in Australia where this has occurred. This specimen consists of precious opal in a glassy volcanic rock called perlite. It comes from west of Mullumbimby, NSW (map p 41).*

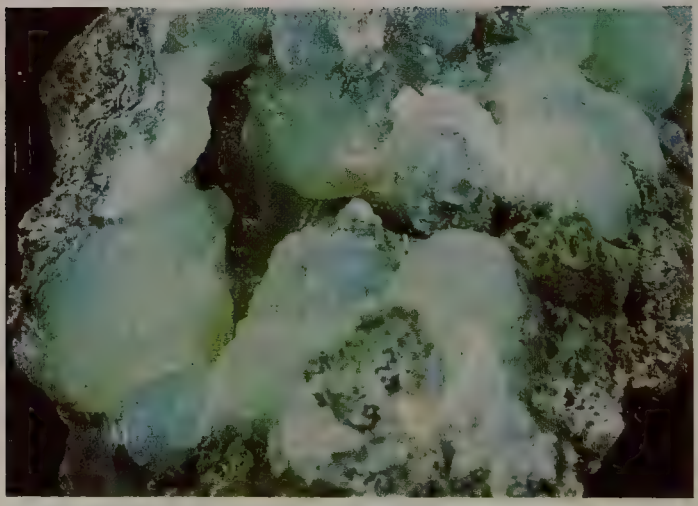


Opalised asbestos—*this polished slice of opalised asbestos, or siliciophite, comes from Mangalo, near Cowell on the Eyre Peninsula, SA (map p 39). Silica-rich water solutions have infiltrated veins of asbestos, depositing common opal. Although the mineral has been completely changed to opaline silica, the fibrous structure of the asbestos is still visible.*

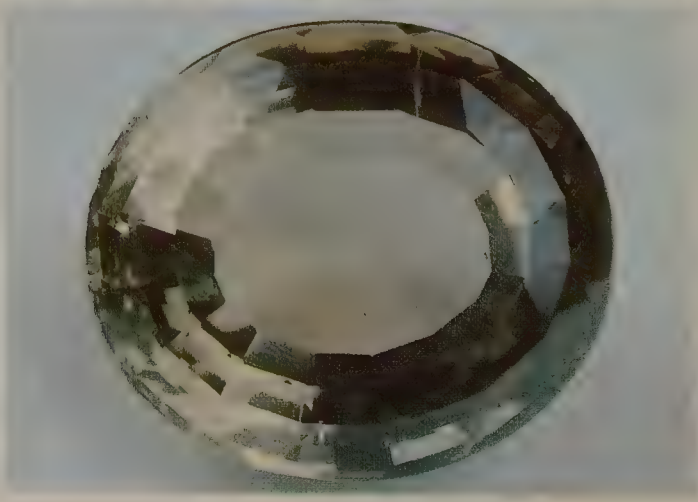
Opal—*this specimen of common opal gets its green colour from the presence of nickel compounds. Like chrysoprase, the mineral is found as veins of weathered serpentine. This specimen comes from Bulong, near Kalgoorlie, WA (bottom map p 37).*



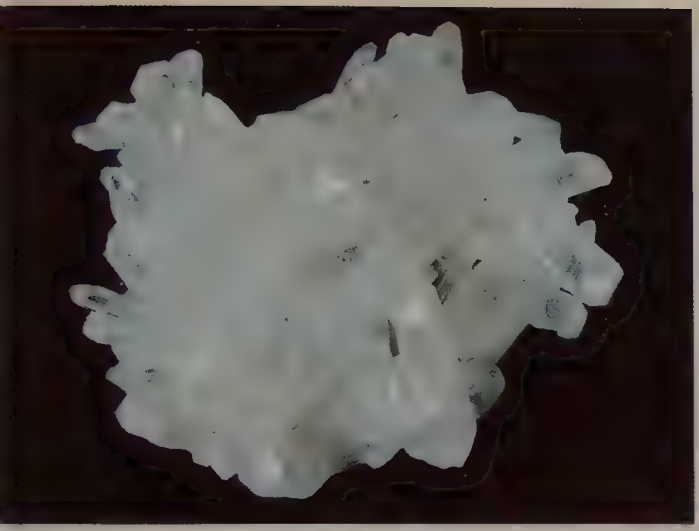
***Prehnite**—this ornamental mineral occurs in the form of rounded masses, called botryoidal — literally 'like a bunch of grapes'. This specimen comes from a mineral cavity in a large dolerite intrusion at Prospect, NSW (map p 45).*



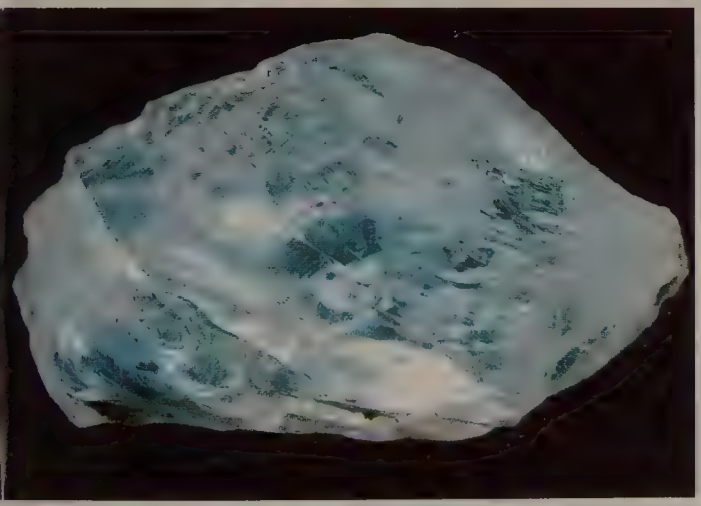
***Prehnite**—this green variety of prehnite also comes from the Prospect quarry. Prehnite is tough enough to take a good polish. It is cut into slices and cabochons.*



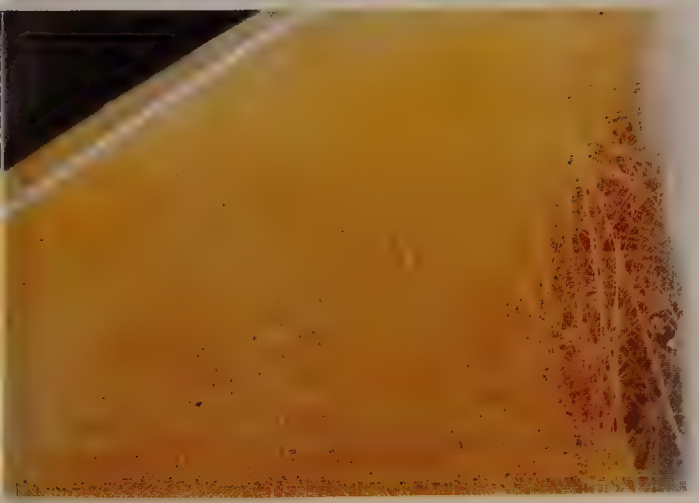
***Quartz**—smoky. A faceted stone from the Oban River, east of Guyra, NSW (top map p 42). This gem mineral ranges in colour from grey-brown to almost black. It is not perfectly transparent, but shows a slight haziness.*



Quartz—*rock crystal. The crystalline form of silica, quartz is the most common mineral in the earth's crust. This group of rock crystals comes from Duncans Creek north of Hanging Rock, NSW (bottom map p 42). In this area quartz crystals are associated with gold and scheelite.*



Quartz—*another example of the absolutely colourless, transparent quartz variety known as rock crystal. It comes from Kingsgate, east of Glen Innes, NSW (top map p 42).*

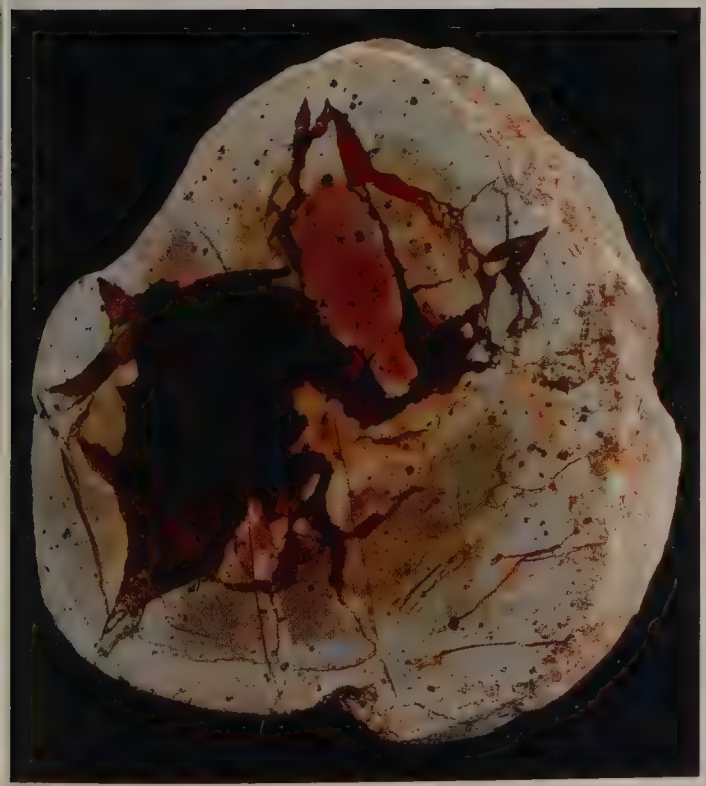


Rutilated quartz—*other minerals are sometimes found as inclusions in quartz. In this case a dense mat of slender crystals of rutile has been included. Rutilated quartz is called 'grass stone'. This specimen comes from Tingha, in New England, NSW (top map p 42).*

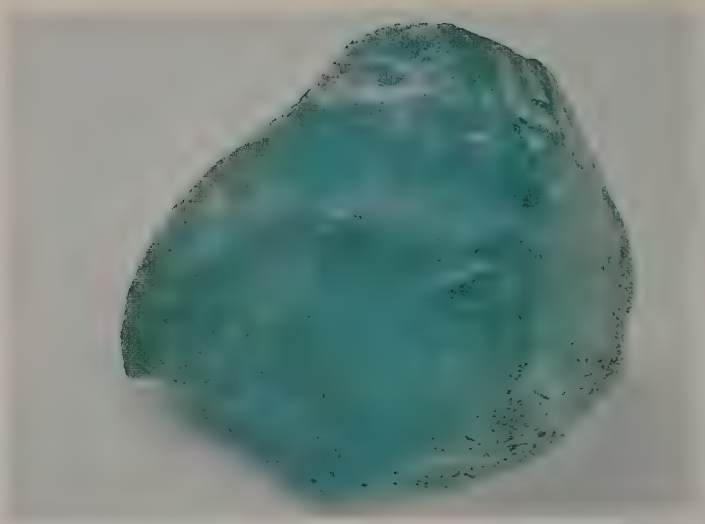
Rhodonite—*when transparent, as in this specimen, this mineral is cut as a gemstone. Rhodonite is found at depth in the Broken Hill mines, NSW (map p 39) in association with galena, the chief ore of lead and sphalerite, the chief ore of zinc. In this specimen, the rhodonite crystals are embedded in silvery white galena.*

Rhodonite—*this massive, finely granular form of rhodonite is known as saccharoidal — 'sugar like'. This specimen comes from the Tamworth region of NSW (bottom map p 42). Together with the Marlborough chrysoprase, rhodonite has been one of the most important ornamental minerals found in Australia recently.*

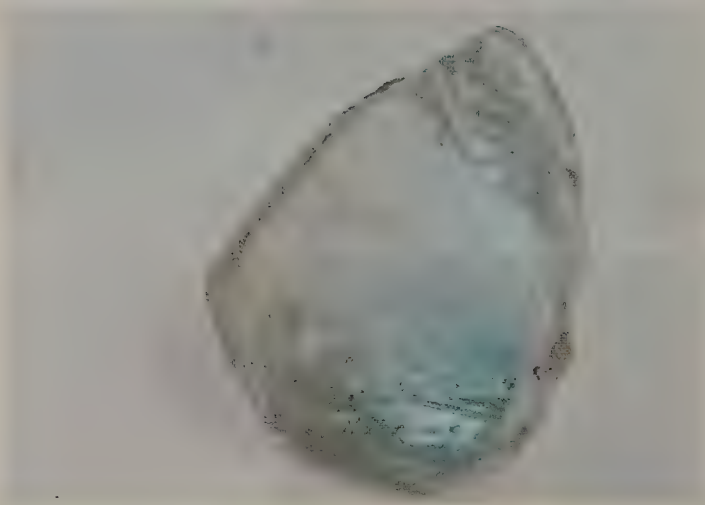
Sapphire—*these small waterworn fragments of the uncommon pink sapphire were shed during the weathering process of basalt. They found their way into small streams forming the tributary headwaters of the Manning River, NSW (bottom map p 42), and were recovered by panning stream gravels. Sapphire and ruby are different gem colour varieties of the mineral corundum.*



Thunder egg
—cavities in thunder eggs are filled with varieties of chalcedony, the most common cryptocrystalline variety of silica. The cavities are formed by the outward expansion of rhyolites and other types of volcanic rocks that exist in a hot viscous state after they are erupted. Chalcedony is then deposited in the cavities. Weathering frees the thunder eggs from the parent rock in more or less rounded masses.

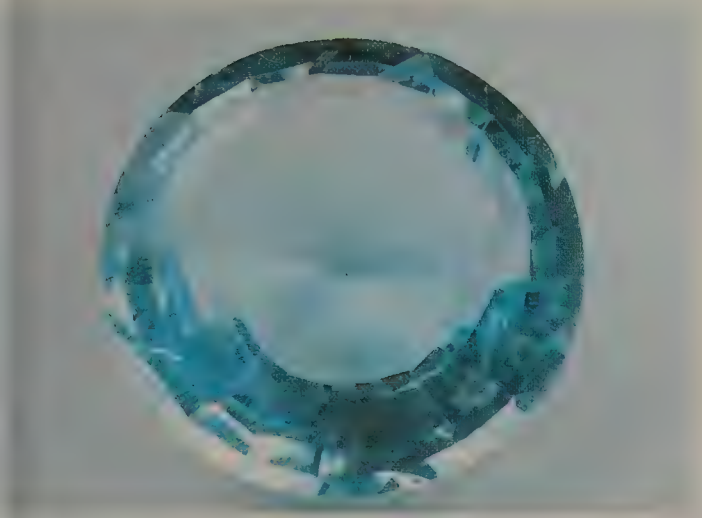


Topaz—*Australian topaz is mostly pale blue or colourless; golden yellow topaz is found only in Brazil. This fine specimen probably comes from Gulgong, NSW (map p 45). Masses of gem quality topaz weighing up to several kilograms have been found by prospectors in the Gulgong-Mudgee area.*



Topaz—*waterworn fragment with cleavage surfaces developed. This picture shows the perfect flawless transparency of gem-quality topaz.*

Topaz—*a fine crystal showing the perfect faces. The outside surfaces show slight evidence of the abrasive effect of gravel action in a stream.*



Topaz—*a fine faceted blue topaz weighing 184 carats. This stone comes from the vicinity of the Oban River, east of Guyra, NSW, (top map p 42) where quartz varieties, including citrine and amethyst, are also found. Most of the gem minerals in this region were discovered by prospectors looking for tin and gold.*

Variscite—*the vein of green mineral in the rock is variscite, one of the more recently discovered ornamental minerals in Australia. It is very rare. This specimen comes from a remote area north of Meekatharra, WA (bottom map p 37).*

Zircon—*this crystal comes from the Strangways Range, 80 km northeast of Alice Springs (map p 38). This zircon area was discovered in the late 1940s and many beautiful stones were taken from the ground surface. But the area has been so over-prospected that no zircons remain.*

Prospecting for gold

On 15 February 1823, Assistant Surveyor James McBrien was working along the Fish River, one of the tributaries of the Macquarie, just west of the Blue Mountains in New South Wales. He wrote in his field book: 'I found numerous particles of gold in the sand in the hills convenient to the river'. This was the first of many occasions on which the precious metal was found in New South Wales and Victoria long before the first official announcements of discoveries in Australia in the early 1850s. Official silence was maintained because of fear that unrest might develop among the convict population.

The Rev. W. B. Clarke, father of Australian geology, found gold at the head of Cox's River, west of the Blue Mountains, in 1844. When he showed the specimens to Governor Gipps in Sydney, Gipps said: 'Put it away, Mr Clarke, or we shall all have our throats cut'.

Panning for gold

Many areas where gem minerals are found in the eastern highlands of Australia are suitable areas in which to prospect for gold, especially where there are outcrops of granite, slate or old hard siliceous rocks, such as quartzite or jasper.

Once a suitable stream is found, the prospector should shovel gravel, consisting of rock fragments, pebbles, sand and clay, from the stream into a special gold pan. Do not completely fill the pan. Then squat by the stream and with the pan tilted away from you, rock it gently, allowing the water to lap over the far edge. Do not immerse the pan too deeply, but keep as much of it in the water as possible for buoyancy, while keeping the near edge out of the water. As the water laps over the far edge it removes, bit by bit, the light sand, while the heavier material sinks to the bottom. Remove the larger pebbles by hand.

Eventually there will be a layer of fine sand on the bottom of the pan. Above it will be a zone of fine black ilmenite (iron titanium oxide) and magnetite (magnetic iron oxide), which are heavier than the sand. Above the black zone, if you are lucky, there may be one or two fine particles or small flakes of gold. Gold is extremely heavy — it has a high specific gravity — and does not wash up to the edge of the pan.

Fool's gold

There are other minerals that the uninitiated can mistake for gold, such as brassy iron pyrites — known as 'new chum's gold' or 'fool's gold' — and golden brown flakes of mica, which are common in granite country. But, with experience, there is no mistaking the beautiful yellow colour of gold.

Should the gold yield be encouraging, one can look around for the spots in the stream bed where gold is most likely to be concentrated. Because gold is heavy, it will be most plentiful at the bottom of gravel deposits and may be in crevices or narrow gutters and sometimes in potholes in the bedrock of the stream. The current runs more slowly on the inside of a curve

in a stream so gold is more likely to be concentrated there than on the outside of a curve. Natural barriers running across the stream, such as rock bars or big boulders, usually have gold concentrated behind them. However, once the current has swept past the barrier it slackens in velocity, so gold may be concentrated in front of the rock as well.

It is useful to have simple metal tools such as thin rods, beaten out flat or hooked, to poke into crevices and hollows in these natural barriers and scrape out sand and gravel in which gold may be concentrated.

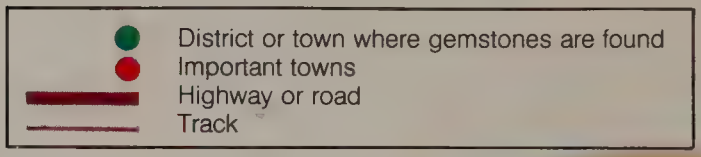
In waterless, semi-desert country, gold-bearing rocks are crushed and the lighter fine material is carried away in a process akin to winnowing chaff from grain. Aborigines in the northwest of Australia are very adept at this, using a shallow wooden dish known as a yandy.

Australia's gold rushes are associated with Victoria, but much of Australia's gold has come from the west, as has this specimen of gold in quartz.

Gemstone areas of Australia

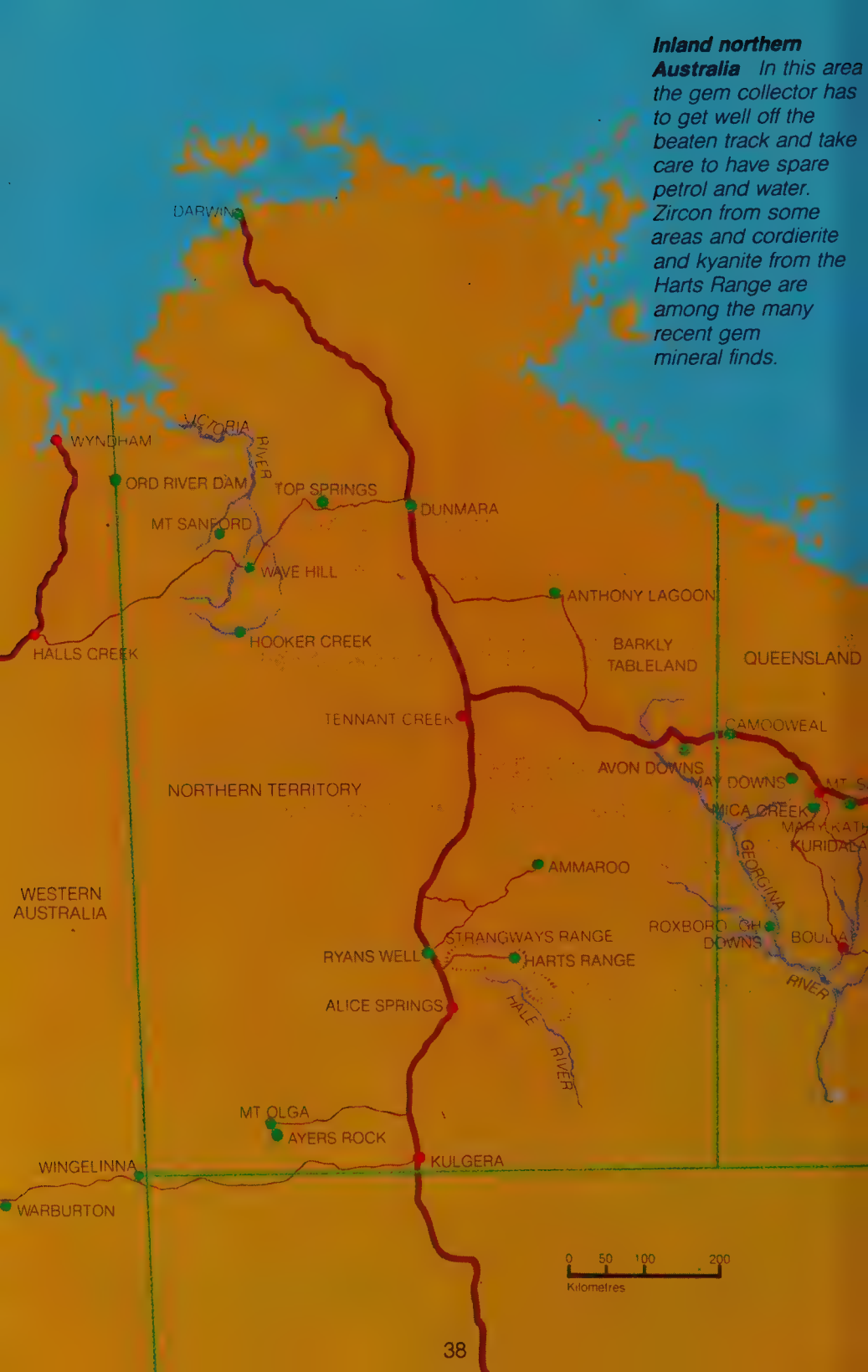
The principal mineral areas of Australia of interest to amateur prospectors are shown on the following pages. Some parts of Australia are rich in gem and ornamental minerals—particularly the opal fields, the vast spread of Western Australia and the sapphire fields of northern New South Wales and Queensland—but others demand more effort. Prospecting for gem minerals in Victoria and southern New South Wales can be hard work, although the fast-running streams of the eastern regions yield many varieties of waterworn pebbles of the silica group that make fine ornamental pendants, when polished. Diamonds and gold are more difficult to find. But Australia, being an old and sparsely populated continent, still has many challenges for the fossicker—whatever the region.

The opal fields *The big opal producers of Australia are the South Australian fields, Coober Pedy and Andamooka. Lightning Ridge, NSW, source of the unique black opal, gives professional prospectors little for a lot of hard work. For the amateur collector, however, all the fields shown are rewarding.*

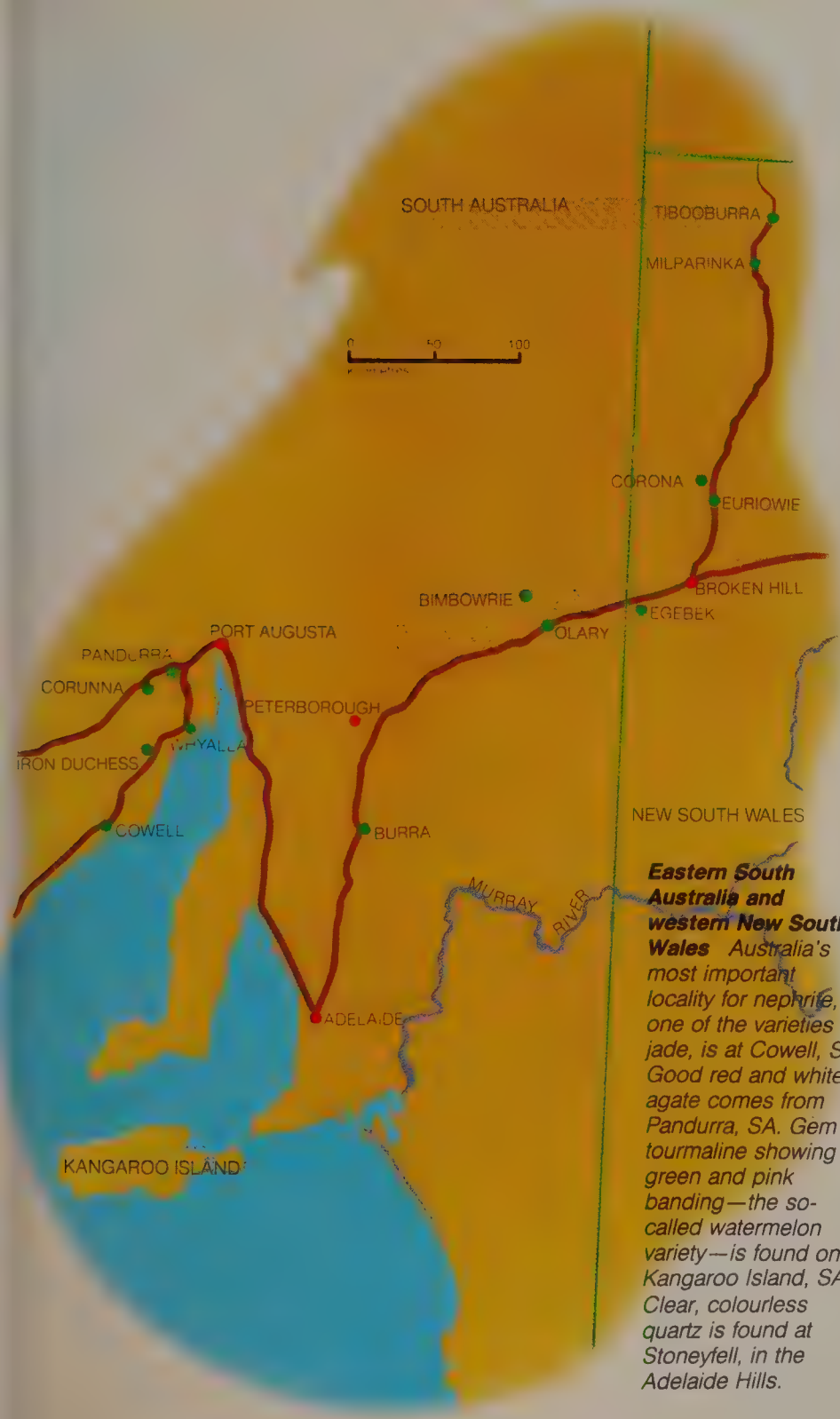


Northwest of Western Australia
The fantastic Pilbara area is an amateur's paradise, from Marble Bar with its banded jasper to Mt Brockman, northwest of Mt Tom Price, with its tiger eyes.

Southwest of Western Australia
Although this is the most closely settled area of the State, seeking the emeralds of Poona and the opalised asbestos of Byro requires travelling long distances over rough dirt roads.



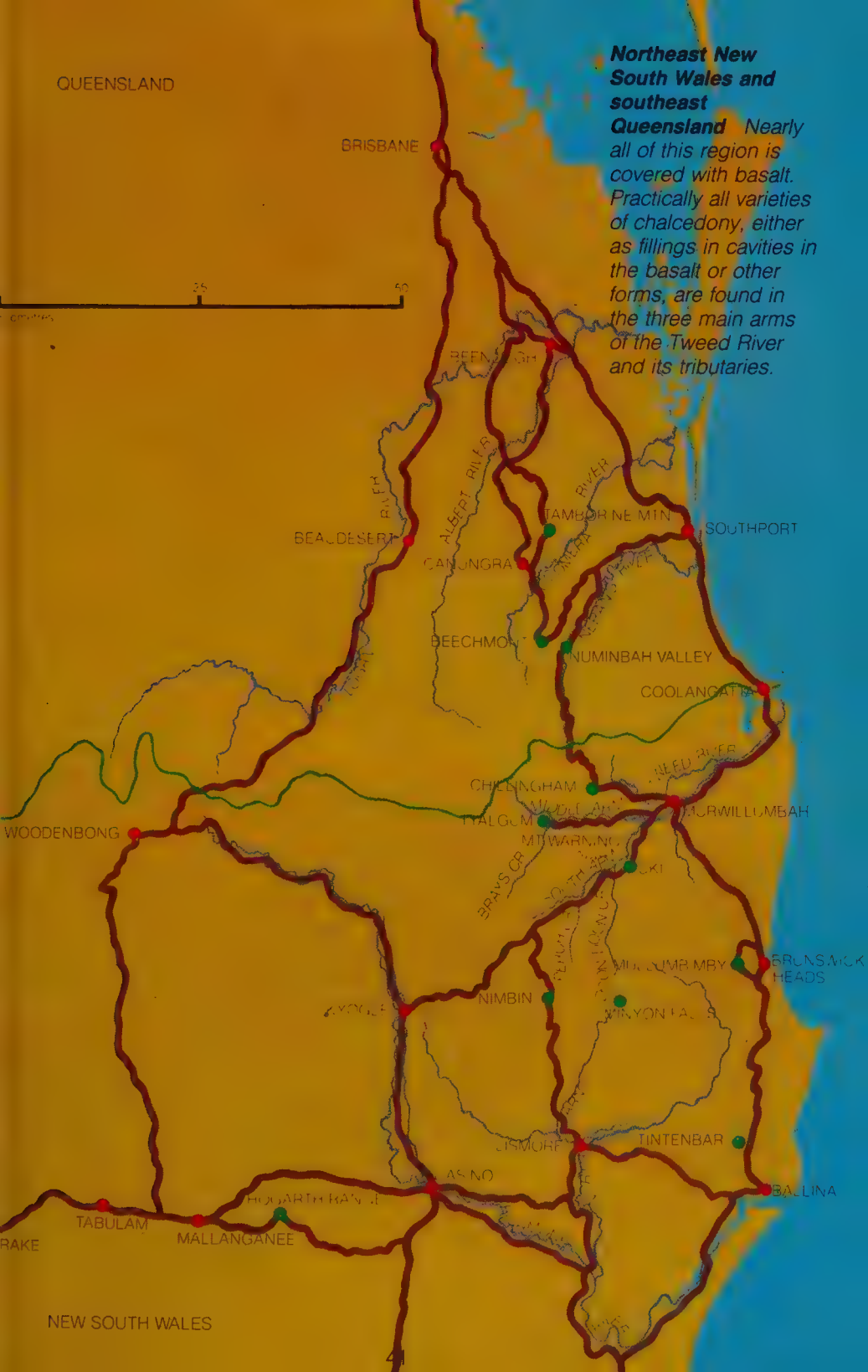
Inland northern Australia *In this area the gem collector has to get well off the beaten track and take care to have spare petrol and water. Zircon from some areas and cordierite and kyanite from the Harts Range are among the many recent gem mineral finds.*



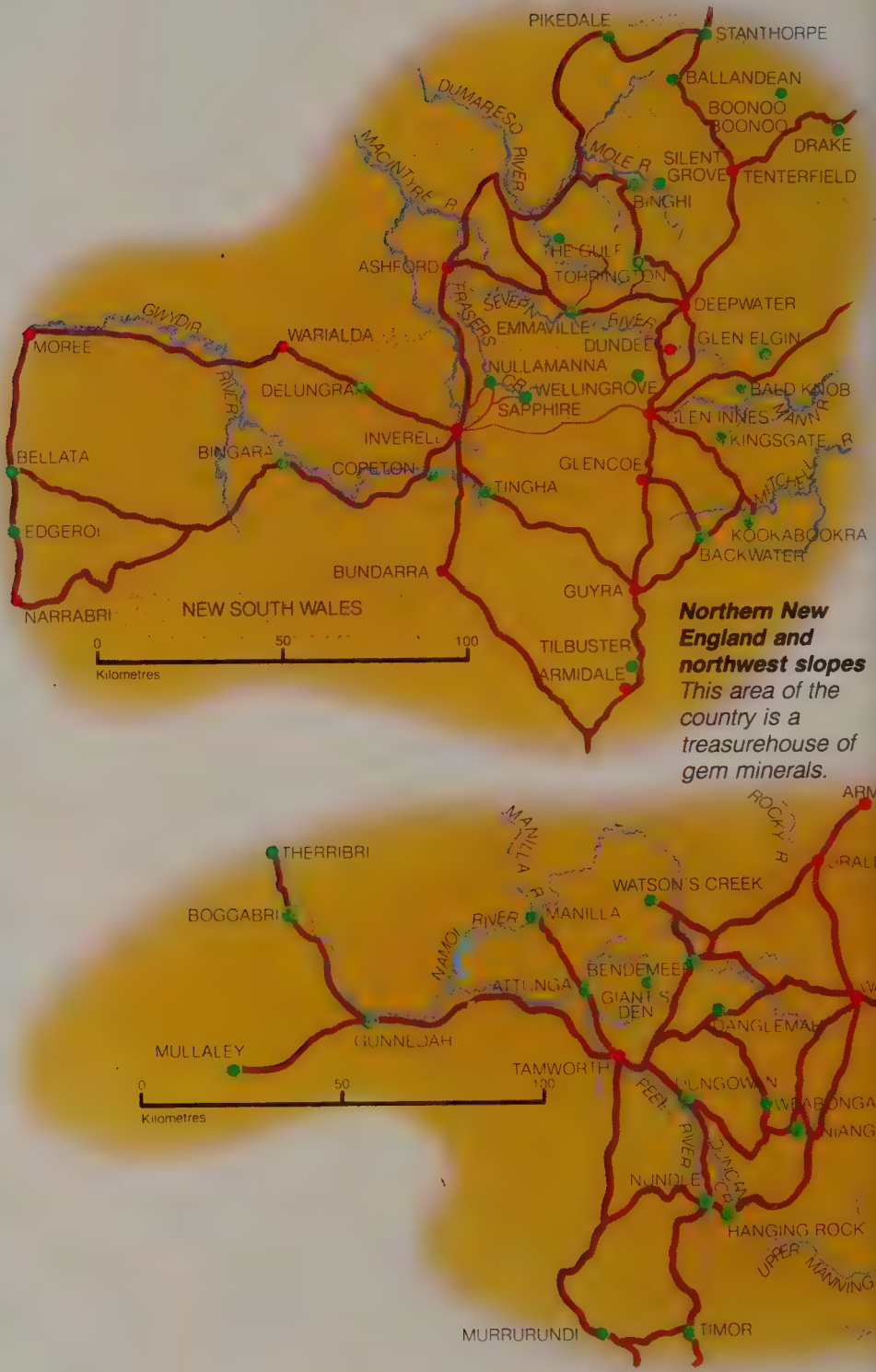
Eastern South Australia and western New South Wales *Australia's most important locality for nephrite, one of the varieties of jade, is at Cowell, SA. Good red and white agate comes from Pandurra, SA. Gem tourmaline showing green and pink banding—the so-called watermelon variety—is found on Kangaroo Island, SA. Clear, colourless quartz is found at Stoneyfell, in the Adelaide Hills.*

Northeastern Queensland *Topaz is found in the gravels of the Tate River and amethyst at Mt Barunda, near Coolgarra. This is another region where distances between fields are long.*

Central Queensland *Two very important and commercially valuable gem minerals come from this area. A big sapphire field is centred on Rubyvale and at Marlborough, north of Rockhampton, is the most important chrysoprase area in Australia.*



Northeast New South Wales and southeast Queensland *Nearly all of this region is covered with basalt. Practically all varieties of chalcedony, either as fillings in cavities in the basalt or other forms, are found in the three main arms of the Tweed River and its tributaries.*

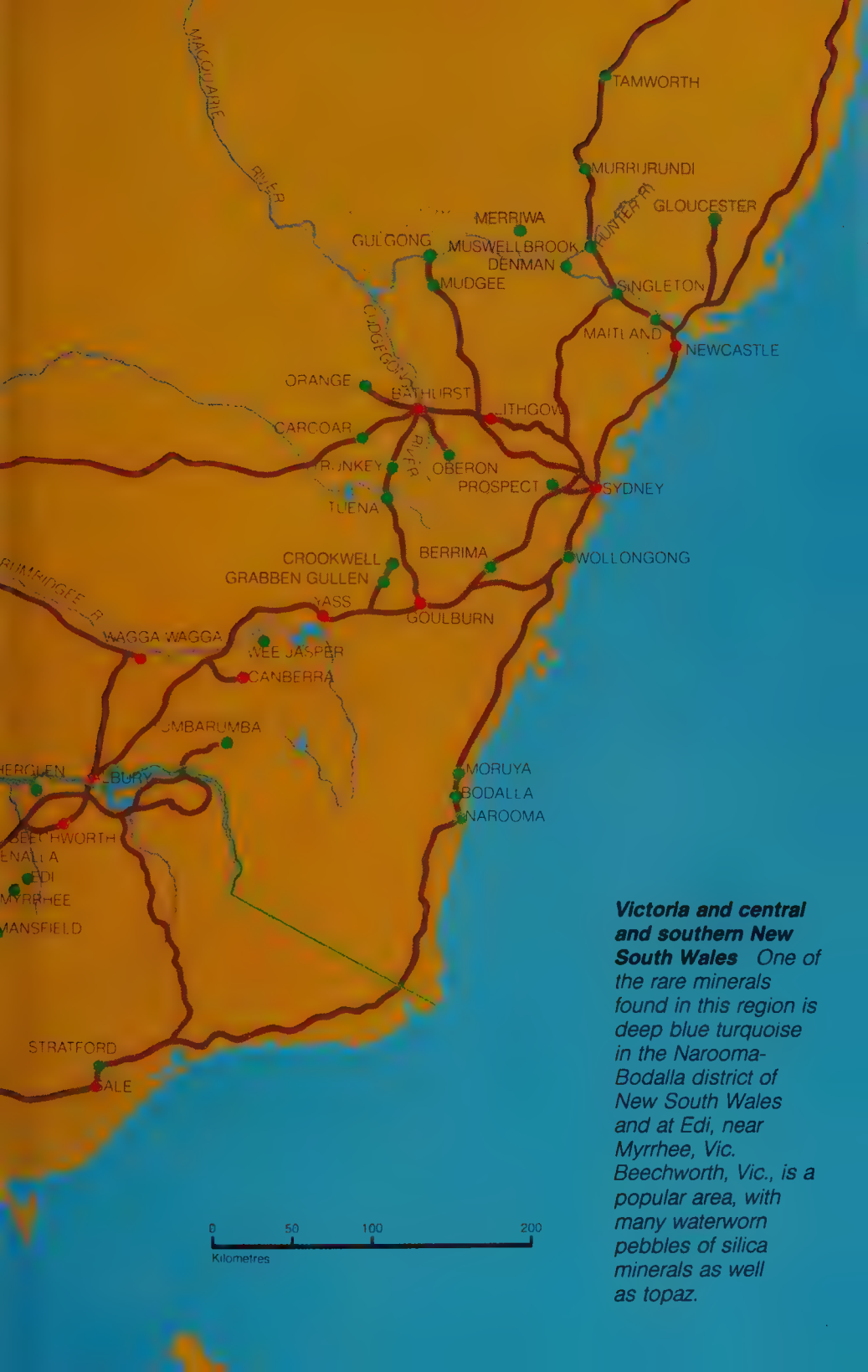


Northern New England and northwest slopes
This area of the country is a treasurehouse of gem minerals.

Tasmania *Much neglected by amateur gem collectors. The best locations are the northeastern region of Gladstone, Mt Cameron and the Weld River, where good sapphire and silica minerals are often found.*

Southern New England *A popular collecting area. Among the many gem minerals found there are jade, of the nephrite variety, at Dungowan; gem-quality zircons along the Hanging Rock-Niangala road; petrified wood at Gunnedah; and cairngorm, the deep brown variety of quartz, at Giant's Den.*


NEW SOUTH WALES
SOUTH AUSTRALIA
BROKEN HILL
OLARY
RENMARK
ADELAIDE
VICTORIA
INGLEWOOD
BENDIGO
DUNOLLY
ARARAT
DAYLESFORD
MELBOURNE
MORNINGTON
PHILLIP ISLAND



Victoria and central and southern New South Wales *One of the rare minerals found in this region is deep blue turquoise in the Narooma-Bodalla district of New South Wales and at Edi, near Myrrhee, Vic. Beechworth, Vic., is a popular area, with many waterworn pebbles of silica minerals as well as topaz.*

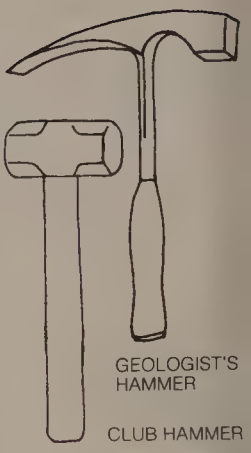
The collector's gear

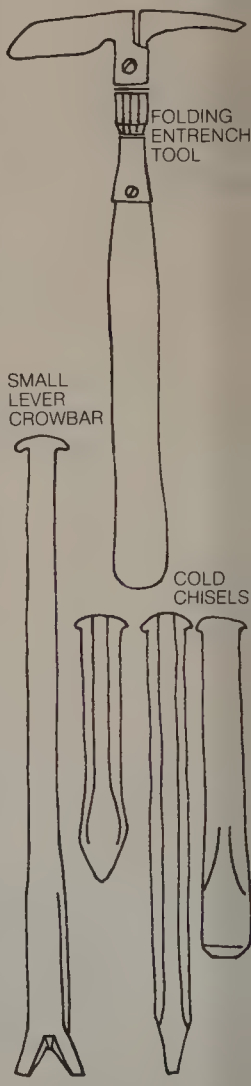
You can fossick for gemstones with ordinary tools, but some specialist equipment will make the task much easier. The first need is a geologist's hammer, which generally is available from good hardware stores and many disposal stores. This hammer has a flat surface at one end of the head and a pick at the other. A club hammer, with a head weighing about 1 kg, is also helpful for breaking up medium-sized rocks.

Other equipment can include a pick and shovel, a heavier sledgehammer with a 3 kg head, a crowbar and several cold chisels.

For washing gemstones from streams you need two sieves, with 6 mm and 3 mm mesh, and a plain tin dish or a gold washing pan. Sieves and gold pans are readily available, though the old wooden-bound sieves are now becoming expensive. Wooden-bound sieves have an advantage over metal sieves in that their buoyancy makes them lighter to use.

Other equipment for gem washing includes a short-handled shovel or entrenching tool; screw-top glass or aluminium containers for specimens, a pair of tweezers to remove small stones that are difficult to handle, a penknife and a hand magnifying glass with a magnification of ten.





How to fossick

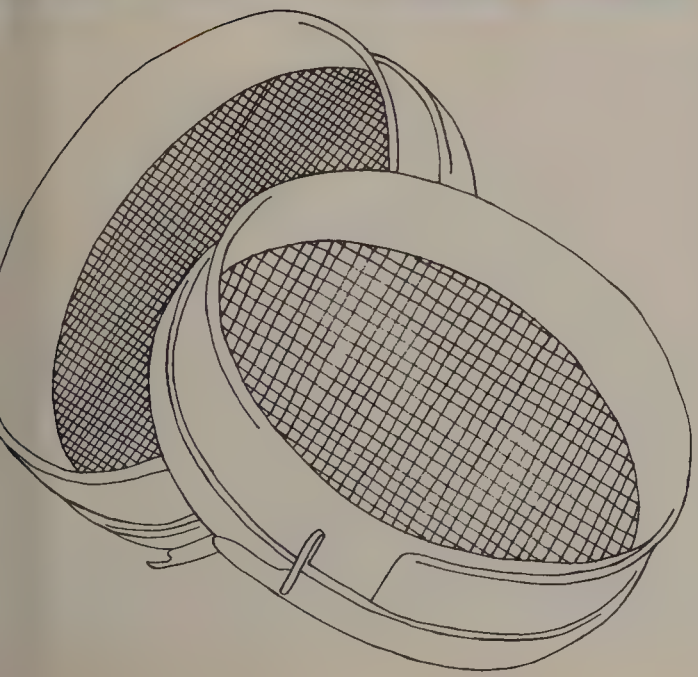
Gemstones can be cut from the parent rock in which they have crystallised or picked out of gem-bearing gravel deposits. The first method is the hardest, because considerable physical effort is needed to break up the larger boulders and an inexperienced seeker can damage the stones in the process. Large rocks are levered out of the ground with a pick and a crowbar and then broken with a large sledgehammer. The pieces are broken down further with a club hammer and geologist's hammer until the gem material is exposed. Great care must be taken at the last stage not to shatter the crystals.

When recovering gemstones from a stream, the finer sieve should be placed in the water with the coarser one on top. Gem-bearing gravel is then placed in the top sieve and this is agitated until the smaller material falls through to the bottom sieve. Once the process is completed the remaining material in the top sieve is picked over and then discarded.

The bottom sieve is then shaken, while submerged, with a jerky, up-and-down, rotating motion which drives the heavier material to the bottom.

The top sieve should then be replaced, more gravel added and the whole process repeated once again until a good 'showing' of heavy material is visible in the bottom of the smaller sieve (you can hold the sieve above your head and look to see how much has been collected if you are unsure). Once a good showing has been achieved, the sieve should be quickly inverted and emptied on to a piece of hessian or other absorbent material in a dry place and the heavy centre material — which should form a circular pattern in the middle of the lighter gravels — examined for gemstones.

An 'old timer' pans for gold at Hargraves, NSW. This is an old gold mining area between Hill End and Mudgee (map p 45). Both professional and amateur prospectors have used traditional gold pans here since the 1860s.



Sieves are essential equipment for washing gem material from stream gravels. A pair is necessary, one with a fine mesh, the other with a coarse mesh.

Polishing and cutting

Nature has been polishing and cutting gemstones by herself for millions of years. A glance at a pebble beach or stream bed will reveal thousands upon thousands of rounded, oblong and hexagonal stones, smoothed and fined down by the tumbling in water and grit.

What nature does not do is put the final glossy polish on the pebbles. Brilliant stones collected from the bottom of a pool soon lose their lustre when they dry out. The aim of polishing stones with the use of artificial grinders is simply to give a permanent 'wet look' to gem minerals.

The principle is the same as in nature but the practice is much faster. The pounding of surf or the flow of a river is replaced by an electric motor driving a plastic or metal drum. Inside the drum, together with the pebbles, is an abrasive sludge, usually silicon carbide mixed with water. When the drum revolves, much in the manner of a cement mixer, the stones are ground by the action of this sludge—which comes in different grades of fineness. The grinding process which takes nature years is reduced to a matter of weeks.

For the amateur, a single-barrel pebble tumbler, which costs about as much as a good 35 mm camera, is the best way to start. Trimmed pebbles are best in this small drum. The process is slower than in two-barrel or three-barrel drums.

There are many types of polishing barrels on the market, ranging from the 'cement mixer' type through the standard round barrel and the hexagonal barrel to the vibrator type. The last type is not a revolving barrel but works by jiggling the contents. It is possibly the most efficient and definitely the fastest, but it is much more expensive than the other types. Tumble polishing is only the first stage of lapidary work and should be fully understood before the much more complicated cutting and faceting of gemstones is attempted.

Cutting and faceting

Gem minerals are cut with diamond saws, of which there are two types. The first is the large slabbing saw, used for cutting rocks into slices and also for halving geodes, agates and thunder eggs. The second type, known as a trim saw, is used in preparing a gem material for polishing or grinding. The trim saw is particularly useful when irregular-shaped pieces of material are to be tumble polished. Chipping irregular pieces with a hammer often produces fractures and may destroy the specimen entirely.

To facet-cut gem minerals a lapping wheel is essential. This machine has an adjustable arm to hold the gemstone at the required angle. The purpose of facet cutting is to bring out the depth and clarity of the gemstone. But it is an extremely complex process and should not be attempted by the beginner. Only gemstones should be facet cut. Faceting does little or nothing for the ornamental minerals, which are best slab cut, tumble polished or ground and polished on a grinding wheel into cabochons.

Care of gemstones

The great majority of gem and ornamental minerals are hard enough to resist abrasion by most substances. Sapphires and topaz are very hard and can only be scratched by substances harder than themselves. The whole family of silica minerals, except the opal, resists abrasion well.

But mere hardness is not enough to protect a gemstone from damage. Although diamond is infinitely harder than any other natural or artificial substance, a blow breaks it easily in four different directions, producing perfectly smooth surfaces. This property is known as cleavage. Other minerals, such as zircon, show cleavage. Topaz also cleaves easily, but in one direction; this is known as basal cleavage. Other minerals, such as zircon, show cleavage in two directions.

Aquamarines and emeralds are hard but extremely brittle and they chip easily. For this reason stones of the beryl family—to which aquamarine and emeralds belong—are seldom found as waterworn fragments in stream gravels. All opal is soft, and common opal is also brittle and breaks with a splintery fracture.

Precious opal, especially that of volcanic origin, may develop cracks, which are lines of weakness, on exposure to the air, because of loss of the water contained in opal. Turquoise, which is softer than quartz, and precious opal are slightly porous, so they should not be allowed to come in contact with liquids, especially oily liquids, that would stain them.

Specimens should be wrapped individually in paper and packed in wooden boxes or stout cartons. Crumpled paper should be put on the bottom of the carton and when the specimens are packed paper should be pushed into any spaces so that there will be no movement. Groups of crystals, especially if they are slender and fragile, may first need a wrapping of tissue paper and cotton wool. Wrapped specimens may also be buried in sawdust or wood shavings.

If a specimen is worth collecting it is also worth noting where it was collected, so enclose a label with full particulars when wrapping the specimen.

Inexperienced collectors sometimes break up a fine specimen to share it with friends. It is better, however, to keep a specimen whole, especially when it shows good features like crystal groupings or interesting aggregates.

The proper way to store specimens is in cardboard trays or drawers in a cabinet. Cut stones should be stored in a velvet-lined box with a lid.

Gem forceps are indispensable in handling faceted stones and cabochons. When examining a stone it should be laid face down before being picked up between the points of the forceps. Do not hold stones in the forceps over hard surfaces such as glass-topped tables or concrete floors. Hold the stone close to the surface of a wooden table covered with paper and bring the eye and the hand lens down to the stone. Do not hold the stone up in the air to examine it against the sky. The stone can easily flip out of the grip of the forceps and may break when it hits the floor.

Fossicking etiquette

The miner's right

Amateur gem collecting has grown so much that State authorities have become slightly apprehensive that certain areas may be overworked and virtually destroyed by misguided enthusiasts. Because of this they are enforcing mining regulations rigidly and in some areas have restricted or banned access by amateurs.

On the other hand, some States, especially New South Wales, have declared some fossicking areas the special preserves of amateur gem collectors and, to discourage professional miners, have placed a limit on the amount of gemstone or payable material that can be removed from that area at one time.

Anyone who is serious about prospecting, or intends to take a 'prospecting holiday' should have a miner's right. Each State issues its own miner's right. Unlike driving licences, they are not interchangeable, so you must have a current miner's right for the State in which you intend to operate. The fee varies from State to State, but is about $2 a year.

A miner's right entitles its holder to prospect on Crown lands that have not been designated for other special purposes. For instance, national parks and state parks, recreation reserves, state forests and timber reserves, water catchment areas, camping reserves and historic sites are all areas where prospecting is not allowed.

A miner's right is not a title deed to any piece of land, but it does give its holder the right to enter non-proscribed or restricted Crown land, to search for gold, minerals or gemstones and to keep any material found.

It does not entitle the holder to prospect on private land without the consent of the owner of that land in agreement with

The headframe of an old tin mine near Emmaville, NSW (top map p 42). Emerald crystals are found with the tin material, which is known as cassiterite.

the local mining warden. On private land the holder of the miner's right cannot, without the owner's consent, prospect within 20 metres of any land in cultivation.

Even with the consent of the owner to look for minerals on his land, a prospector should try to gain the goodwill of the property owner. One should avoid disturbing the land as much as possible. One of the worst offences is neglecting to close gates, thus allowing stock to wander.

Camp sites should be cleaned before leaving and care should be taken with fires.

Safety in mine workings

Many gemstone areas are in remote and arid regions of the country and all the usual precautions about travelling in the outback should be observed. Vehicles should be in good repair; camping gear, vehicle repair equipment and the first-aid kit should be adequate.

Amateur prospectors should exercise special caution in exploring old mineshafts and underground workings. Several amateurs have been killed by groundfalls while working under overhangs, by shaft collapses and by asphyxiation. Experienced miners know that simply because an excavation looks safe there is no guarantee that it is. Care should be also taken while working below large boulders.

Many old mine workings contain dangerous gases and they should not be entered if the prospector has even the slightest suspicion that the air could be foul. To test a shaft a naked flame should be gently lowered on a cradle. If it goes out this means that shaft could contain large amounts of carbon dioxide or carbon monoxide. Another gas that can be present is hydrogen sulphide—easily recognised by its 'rotten egg' smell. If there is any doubt at all, the shaft or working should not be entered.

Sources of information

The mines departments of most States issue a large quantity of material on gemstone collecting. Outstanding examples are New South Wales and Queensland, which both issue detailed books on gemstone collecting and gemstone areas.

Lists of publications can generally be obtained from the State tourist offices in the capital cities and more detailed information from the mines departments in the various States.

In addition there are rockhounds' clubs in most States. Their names and addresses can be found in the 'clubs and organisations' section of telephone directories in capital cities, and further information can be obtained from gemstone shops in most capitals.

Three good reference books for the serious fossicker are:
Australian rocks, minerals and gemstones, by R. O. Chalmers (Angus and Robertson)
Minerals, rocks and gems: A handbook for Australia, by J. A. Talent (Jacaranda Press)
Australian and New Zealand gemstones: how and where to find them, edited by Bill Myatt (Hamlyn)

Glossary

Alluvium Deposit laid down by a river and movement of water; the deposit at the bottom of old or new lake beds and at the mouth of a river. Many alluvial deposits contain gold and gemstones washed out from their original parent rock.

Amber Fossilised tree resin. Amber is often wrongly called a gemstone because of its beauty. Having first been formed by a living organism, it is no more a gemstone than is a pearl.

Assay Method of finding out the abundance of metals in ores by smelting ore-bearing rock with other reactants.

Base metal Any metal worth less than gold or silver.

Bedrock The solid base rock which supports sandy or clay formations or any exposed or unexposed rock which forms a base for other materials.

Boulder Any rock or fragment of rock which is bigger than 250 mm in diameter.

Brilliant Type of cut used in faceting gemstones to bring out the maximum amount of 'depth' and 'fire' in a stone. Generally a brilliant-cut diamond has 33 facets on its crown and 24 on the pavilion.

Cameo Any object, including a gemstone, in which a human figure, plant or animal is cut out of the surface in low relief.

Carat Unit of weight. There are five carats to a gram and 141.75 carats to the avoirdupois ounce.

Cleavage The tendency for a crystal to split along particular planes determined by its internal structure.

Concretion Mineral material formed within another rock by being deposited around some kind of core.

Diaphaneity The transparency of a gemstone.

Dripstone Minerals formed by the action of water containing certain elements in solution. Stalactites and stalagmites are classified as dripstones

Fault Fracture in the earth's crust, often associated with volcanic or subsurface movements.

Fineness The proportion of silver or gold in refined metal, expressed in mathematical terms as parts per thousand.

Geode Hollow ball of rock in which the interior is lined with crystals. The best known geodes in Australia and elsewhere are lined with agates and are known as 'thunder eggs'.

Lapidary Literally a 'worker in stone', but in modern usage only one who works with gemstones.

Lustre Term refering to the general appearance of a mineral surface in reflected light. Terms used include metallic (as in metals), adamantine (diamond-like), vitreous (glassy), resinous, pearly, silky and greasy.

Mineragraphy Study of the polished surface of minerals.

Opalescence Although this word is associated with opal in general terminology, it is used in association with other gemstones and minerals to refer to the degree of milkiness.

Skeleton crystals Hollow or incompletely developed crystals of any mineral.

Zone A set of crystal facets whose lines of intersection are parallel.