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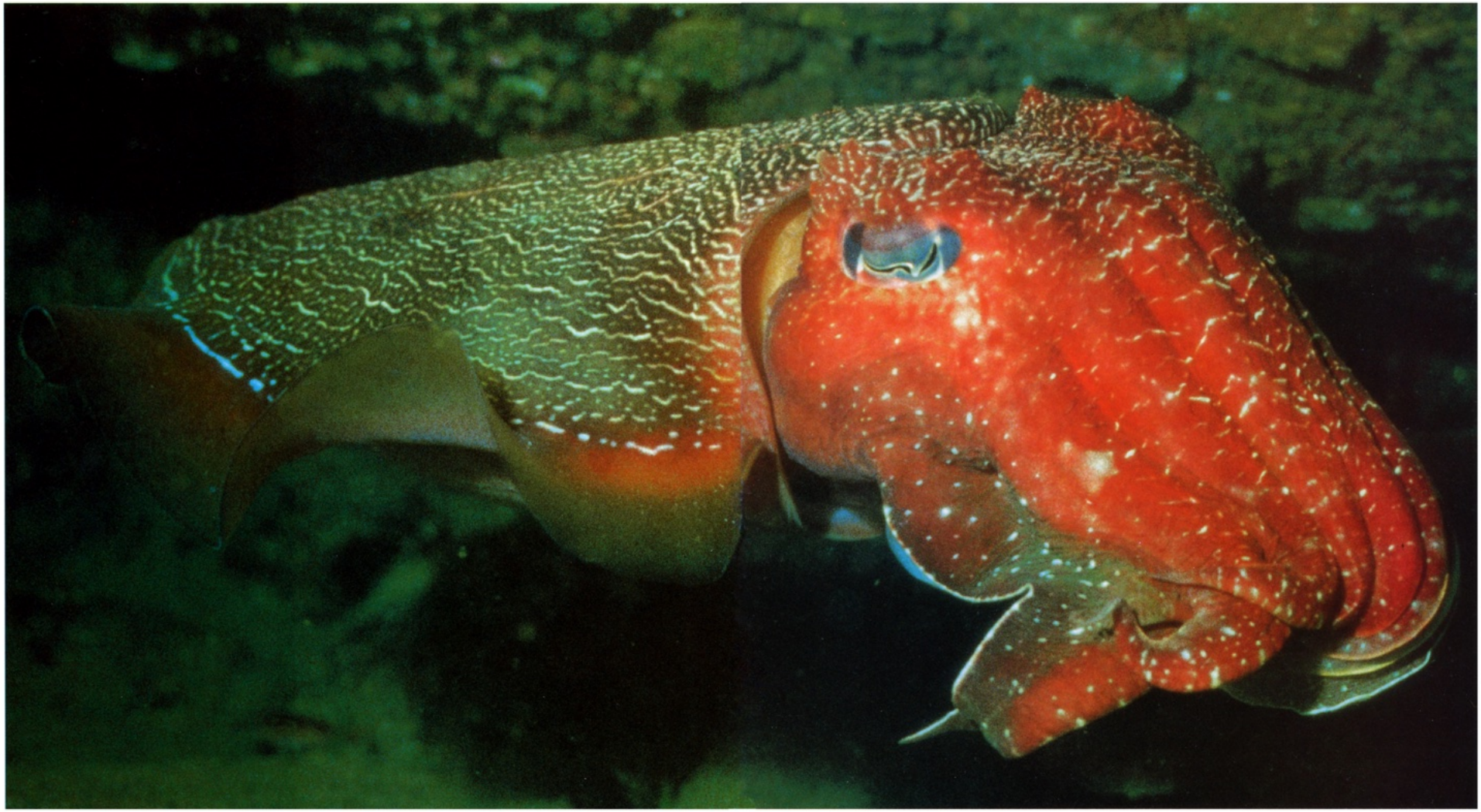


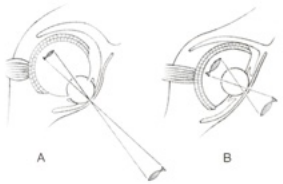
How I Learned To Get Along Swimmingly With

The Giant Australian Cuttlefish

TEXT AND PHOTOGRAPHS BY GARY GRAF
ILLUSTRATIONS BY MICHAEL GORMAN

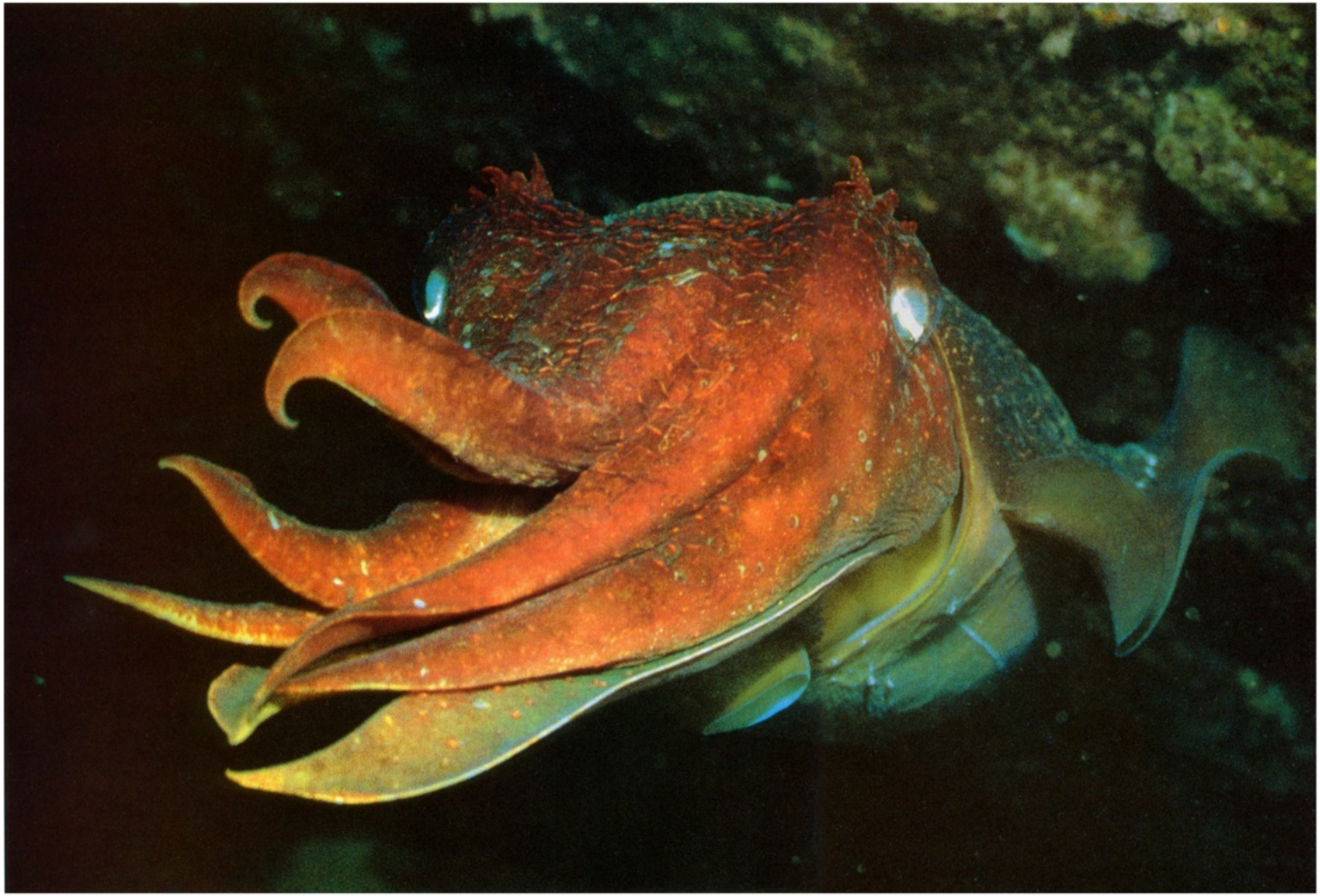
I'VE GOT a lot of time for cuttlefish. Especially *Sepia apama*, commonly known as the giant Australian cuttlefish. I suppose to most people this is tantamount to admitting a deep, meaningful relationship with a pet rock. But to any other diver who has encountered these engaging animals, such a declaration will most likely bring a grin and a knowing nod. We cuttle-fanciers share a special appreciation.

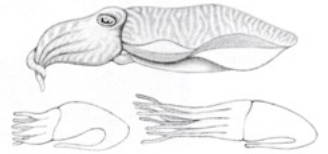
I remember the first time I ran into one. Vividly. I was diving at about 30 metres below the northern headland at the entrance to Jervis Bay, an underwater wonderland some 100 kilometres south of Sydney. Blithely swimming through a jumble of massive boulders, I suddenly came face to face with a strange creature which I didn't even know existed. It had a flattish, shield-shaped body, with narrow



The eye of the cuttlefish evolved independently. Vertebrate eyes focus by changing lens shape; the cuttlefish eye, like that of other cephalopods, focuses by changing the distance between the retina and the lens (A and B in illustration).

(Previous pages) The giant Australian cuttlefish belongs to the mollusc class Cephalopoda, along with some 600 other species of cuttlefishes, octopuses, squids and nautiluses. Although showing many signs of being a surprisingly intelligent animal, the cuttle (as a mollusc) includes among its kin clams, slugs and other such none-too-bright creatures. Some cuttlefish are as outgoing as puppies, actually following divers around – a few will even hold still for a gentle scratch, closing their large eyes, basking in the attention. These eyes (opposite left) are quite complex, and much like human ones in construction: they see well, recording movement, but no studies have demonstrated that they discern colour. (Above) When excited (either during perceived threat, or mating) the giant Australian cuttlefish may flash a spectacular array of colour changes, from brilliant red-orange to iridescent blue-green.



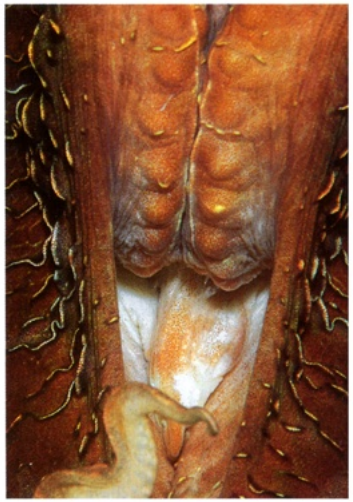


Jet propulsion gets the cuttlefish quickly out of danger. When swimming at a slow pace to hunt for prey, the cuttlefish moves its lateral fins in a series of undulating motions; to accelerate, it closes the opening of its mantle cavity and forces a jet of water through its siphon by constricting the muscles in the wall of the mantle. The siphon is also used to steer in any direction by turning it at any desired angle.

(Above) Most cuttlefish tend to be shy, retiring types, who withdraw under ledges and into caves and crevices during the day, emerging to hunt for food at night. Their diet consists primarily of fish, crustaceans and other molluscs. They themselves fall prey to large aquatic animals like sharks and dolphins. (Opposite above) Cuttlefish propel themselves in a series of spurts, drawing water into a compression chamber and giving a mighty squeeze to jet the water out a funnel under the head. The nozzle of this funnel can be swivelled to change direction, or narrowed to control speed. To get this shot I swam blindly upside down below the cuttlefish: a sight not without its humorous aspect.

undulating fins along each side – and a mass of arms drooping down in front like a big nose. While obviously related to the small squids I'd swum across on numerous other subventures, *this* specimen must have been taking steroids. It stretched a good 1.5 metres from tentacle tip to posterior point. I immediately thought of those school-book line illustrations depicting gigantic, multi-armed denizens of the deep, wrapped around hapless old sailing ships. There was no doubt in my mind that the monsters in those drawings (order Teuthoidea, genus Architeuthis) had a contemporary counterpart in the creature drawing closer to me. I then started wondering whether this one had reached its full adult size – or whether, behind those huge rocks, lurked a much bigger, very protective mummy or daddy.

(Opposite) A giant Australian cuttlefish approaching, with two arms raised – a type of hostile behaviour not uncommon during the spring mating season. The hunting tentacles are the two longer arms underneath. In the centre of all these waving arms is a very sharp, parrot-like beak with which the cuttlefish holds its victim, while its toothed, tongue-like organ (called a radula) rasps it into digestible pieces. (Above left) Rather than shove my camera into this cuttlefish's maw, I resorted to a 105 mm micro-lens. Despite any aggressive cuttlefish demeanour, I've yet to hear of a single rubber-skinned amphibian being made a meal of – although I have seen a few divers furiously finning the other way, as if such a fate were a distinct possibility.



I didn't dwell long on such a possibility, however, because there was a far more important consideration: I had to get a photograph. I swam towards the animal, with my housed Nikon raised to my eye. Without any obvious sign of locomotion the creature moved slowly backward. When I stopped, *it* stopped too. I began finning more slowly, and it warily allowed me near enough for a shot. But it apparently wasn't used to this sort of attention, because when my strobe flashed, the creature blushed furiously, changing colour from mottled brown to brilliant vermilion: colour *me* 'impressed'! I tried to take 'just one more', but the cuttle turned reticent and retreated under a deep inaccessible ledge.

Since that episode I've done some reading and discovered that cuttlefish are solitary by nature and generally shy, venturing from their caves and crevices to hunt food, mainly at night. But personally I've met some with a much more *outgoing* temperament. Over the years, usually during the spring and summer months – they head for deeper water during winter – giant Australian cuttlefish have often kept me company and made my dives more enjoyable. On several occasions I've even found them waiting near the anchor as I've come down the line. Not unlike a puppy, they would follow me around, showing the same interest we might in an Extra Terrestrial – and, like a puppy, they would hold still for a gentle scratch on the forehead, closing their large eyes to luxuriate in the attention. Or so it seemed to me!

Speaking of their eyes, the cuttlefish has a quite complex pair, much like our own in construction. They see very well, recording not only movement, but interpreting accurate images as well. When you look into these 'mirrors of their souls', you are conscious that the creature is 'in there looking back', with what appears to be either curiosity, bemusement or benign indifference: I'm never sure which. During the spring mating season you may also see a bit of aggression, easily recognisable as the cuttlefish moves forward with its arms held high as if about to reach out and wrap itself around you.

CUTTLEFISH have eight sucker-lined arms, plus two longer prehensile tentacles (normally kept tucked away in a pair of pouches under their eyes). When the animals are just hovering about, their arms hang down in front of them. When they're out for a swim (generally in reverse), their arms extend to form a smooth torpedo shape. And when they're looking for their next meal, they uncoil their two hunting tentacles. As soon as the cuttlefish gets close enough, these longer arms shoot out like a whipsnap and grab its prey. Then – moving quickly forward – the cuttlefish uses its octet of arms to engulf the victim and shovel it towards a very sharp, powerful parrot-like (upside down) beak. Here it's held for dicing before being swallowed for digestion. To my knowledge, no divers have yet *gone* this way – but I've been with a few who evidently thought such a fate might be on the cards: amazing how fast one can swim when one really wants to!

In those instances where a cuttlefish *has* behaved aggressively towards a buddy, I've never been sure whether I was witnessing a predator bent on sampling a rubber-skinned alien, or the pass of a would-be lover. If the cuttlefish's advances were of an *amorous* nature, the diver may have had his or her hands full! Literally. Mating cuttlefish can really get 'wrapped' in each other, entwining their many

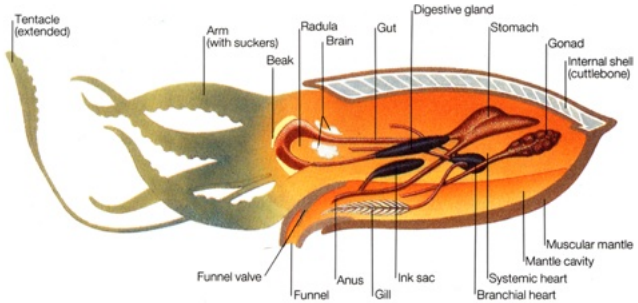
When just hovering (opposite), the giant Australian cuttlefish lets its arms droop down in front. Additional to these eight arms, the cuttlefish has a pair of longer tentacles normally stored in cheek pouches. These are used to shoot out and grab prey when hunting. The octet of sucker-lined arms then engulfs the victim, shovelling it towards the mouth.

arms in fervent embrace. As they cling together, like so much animated spaghetti, there's no disguising the intensity of their excitement. Their bodies undergo a frenzied series of colour changes, flashing back and forth from a passionate red-orange, to an iridescent blue-green; something like a traffic light gone beserk.

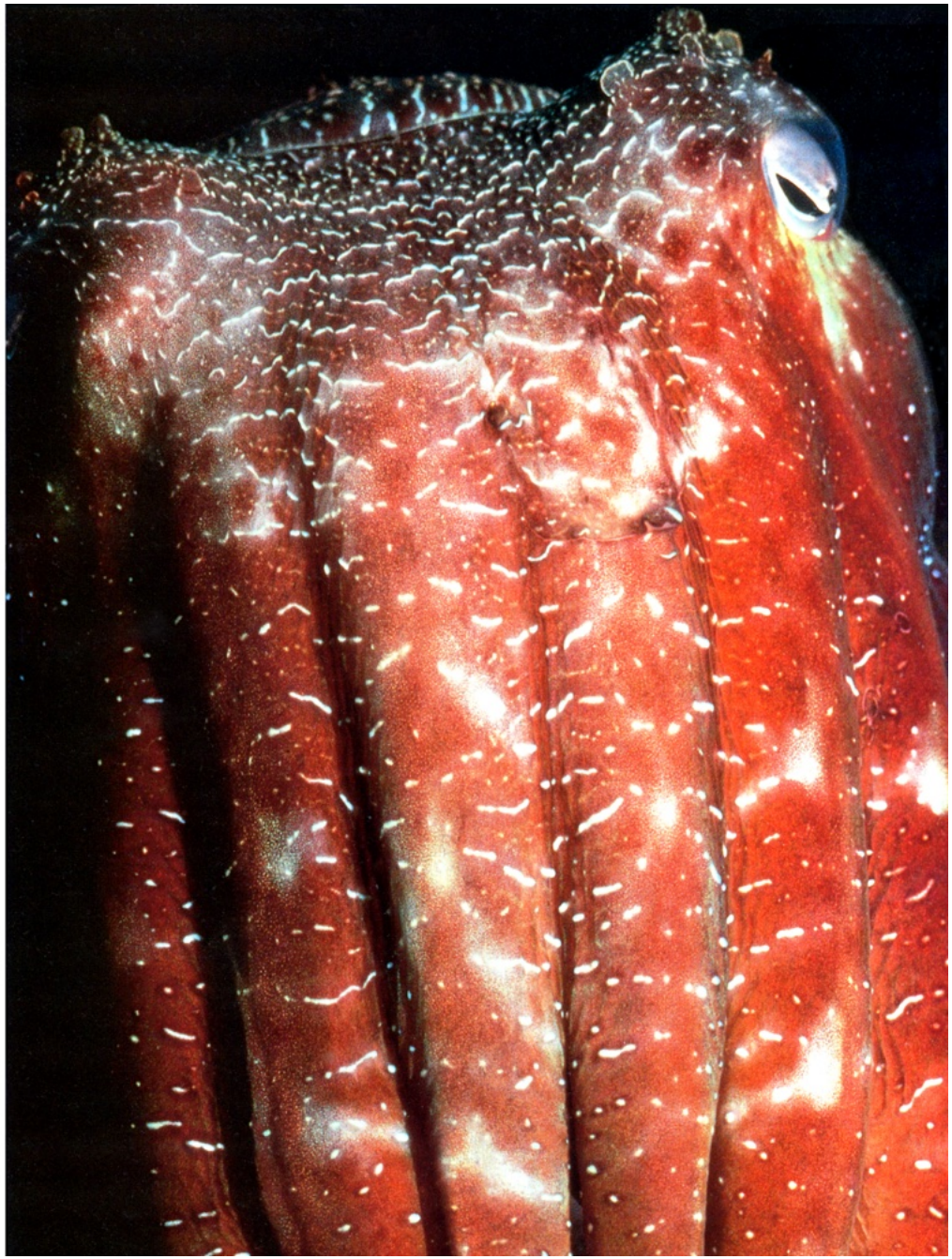
Normally, cuttlefish use this appearance-changing ability as a means of camouflage. After registering the colour and texture of the surrounding subterrain, their highly-developed brain alerts the thousands of tiny pigment cells buried throughout the skin tissues. As the chromatophores expand and contract, you can actually see the message spread from the animal's head to its hinter-areas, in a kind of rippling wave. Complete colour transformations take only a few seconds. As well as the rainbow of hues displayed when feeling aggressive or amorous, the animals can also blanch nearly white to blend with a sandy bottom, or darken greenish-brown to match their favoured rocky habitat. To make its protective colouration still more convincing, the giant Australian cuttlefish will raise protuberances called tubercles along its skin surface, causing it to appear uneven and irregular, like the lumps and bumps of its background.

The creature resorts to its famous sepia ink only when seeing no other recourse, preferring to rely on its camouflage capability to hide from enemies (notably large aquatic animals like sharks and dolphins). Naturally, the same camouflage comes in handy when stalking its own prey (mainly fish, crustaceans and other cuttlefish).

Then there's the mating ritual: once the giant Australian cuttlefish male deems there's been foreplay enough, he uses his hunting tentacles to carefully spoon a sperm packet into his ladylove. When her time comes to lay eggs, the female reveals a rather poorly-developed maternal instinct. Unlike her cousin the octopus, she does not seek out a well-protected lair; nor does she ferociously guard her eggs against all comers; or continually aerate them with water. Instead, she looks for some algae, a bit of soft coral or a sheltered patch of reef where the water movement is sufficient. Posit-



A cuttlefish's mouth is provided with horny jaws and surrounded by sucker-equipped tentacles. A pair of gill hearts that pump blood are housed in a cavity protected by a muscular mantle. Water is forced out of the mantle cavity through a tube called a siphon in a jet stream thus propelling the cuttlefish. When excited or alarmed a dark fluid is discharged from the ink sac. Cephalopods, or 'head-footed' animals, such as the cuttlefish, are the most advanced of the molluscs with the shell being external and large in natuloids, smaller and internal in squids and cuttlefish, and non-existent in octopuses.

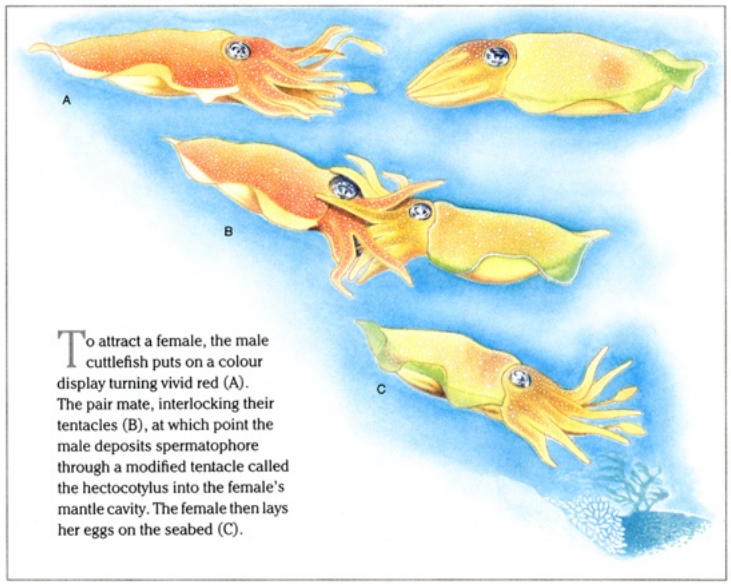


ioning her funnel she then deposits 100-300 leathery white eggs. After covering her new offspring with ink to hide them from predators, she may stay around for a *short* while. Then again, she may not. No doubt she'd be a big fan of day-care centres.

When the grape-sized eggs eventually hatch, the juveniles appear as 13 millimetre replicas of their parents. After a short planktonic spell, they enter their jet age. Between the cuttlefish's head and the collar of its mantle, lies a compression chamber – when the animal wants to go swimming, it fills this cavity with water and gives a mighty squeeze of the muscled walls. This seals the intake and forces the water in a rush out the funnel under the head, spurting the cuttlefish smartly along. If you swim beneath one, you can see just how it controls speed and direction. When it wants to step on the gas, or throttle down, it widens or reduces the funnel opening; when it wants to change course, the cuttlefish swivels the funnel-nozzle to point in the direction it was just leaving. If you put your hand under a cuttlefish you can feel the jet of water pass across – an unusual kind of intimate sensation.

CONSIDERING all the reasonably sophisticated behaviour described here, it's hard to imagine that cuttlefish are actually molluscs. Admittedly, this phylum features some of the animal kingdom's most diverse creatures in terms of both form and function, but even so, it doesn't seem right that the giant Australian cuttlefish (along with some 600 species of other cuttlefishes, octupuses and squids) should number among their relatives clams, slugs and suchlike. It would appear that others have found these unique animals something of a paradox: the early biologists who gave them the class name Cephalopoda, apparently weren't even certain whether the animals were 'coming' or 'going'. The Greek word *kephal* means 'head', and *'podas'* 'foot'. (During embryological development the foot develops from the head, say the scientists.)

In common with other molluscs, cuttlefish show little sign of segmentation. They have a muscular sheet, the mantle, surrounding their organs; and, of course, a shell, albeit a well-hidden one embedded in the muscle of the mantle. If you're a beachcomber or bird owner, you're undoubtedly familiar with the honey-



To attract a female, the male cuttlefish puts on a colour display turning vivid red (A). The pair mate, interlocking their tentacles (B), at which point the male deposits spermatophore through a modified tentacle called the hectocotylus into the female's mantle cavity. The female then lays her eggs on the seabed (C).

combed hunk of lime popularly called a 'cuttlebone'. Additionally to providing calcium and salt for untold thousands of budgies, the cuttlefish's internal shell has been used over the years for cosmetics, dentrices and antacid medicines – (no wonder they usually seem so calm.)

Although some of his nearest mollusc-kin have discarded their shells altogether, the cuttlefish still finds a use for his. In the same way that a submarine uses ballast tanks, the cuttlefish fills the tiny compartments in its shell with gas, to help maintain a neutral buoyancy. Unfortunately, having such a large, rigid object inside it *does* prove a bit restrictive when it comes to getting about. Which is why you generally see the animal either lying around, or hovering just off the bottom. Moreover, jet-propelled though he may be, the cuttlefish really can't move through the water all that quickly.

Once upon a time there were lots of other cephalopods, slowly jetting about underwater, but most species have now become extinct. Those which have managed to stick around have done so by growing smaller. (I don't like the chances of those remaining deep-sea [Architeuthis] squid which reach 20 metres in length!) Although the number of species is considerably reduced, cuttlefish still form a large population, and according to scientists constitute a potential human food source. (Frankly, I find that thought about as appetising as the idea of eating a puppy.)

If you'd like to discover just what we cuttlefish fanciers share, try the warmer coastal waters of the world – particularly the Mediterranean Sea and Indo-Pacific region. If you especially want to meet a giant Australian cuttlefish, I suggest you concentrate on the rocky shores from New South Wales to Western Australia. Look under ledges, in caves and crevices, along gutters and cliffs – even among kelp. If you're lucky, you might find a friendly-sort waiting for you at the bottom of the anchor line. When you *do* spot one, don't be afraid to move right in: cuttle a little closer! □

A graduate of Boston University's School of Communication, GARY GRAF, when not writing articles for diving and photography magazines, works as a copywriter in Sydney.

A very young giant Australian cuttlefish – only about 200 millimetres long. When they hatch from their leathery white eggs, the juveniles are tiny: just 13 millimetres in length, these scale-model replicas of their parents spend a short time in a planktonic stage before becoming jet-propelled. I haven't yet observed an adult with either the yellow ring around the eye, or sporting such soft-pink colouration.