= Ocellated electric ray =

The ocellated electric ray or bullseye electric ray (Diplobatis ommata) is a species of electric ray in the family Narcinidae , native to the shallow inshore waters of the eastern central Pacific from the Gulf of California to Ecuador . Reaching 25 cm (9 @.@ 8 in) in length , this species has a rounded pectoral fin disc and pelvic fins with convex margins . Its short and thick tail bears two dorsal fins and terminates in a triangular caudal fin . The ocellated electric ray is named for the distinctive large eyespot on the middle of its disc , consisting of a black or yellow center surrounded by concentric rings . Its dorsal coloration is otherwise highly variable , ranging from plain to ornately patterned on a light to dark brown background . The front part of its disc is darker brown .

Solitary and nocturnal in nature , the ocellated electric ray is a bottom @-@ dweller found in sandy and rocky habitats . It moves along the bottom by " hopping " on its pelvic fins , and feeds on small crustaceans and polychaete worms . For defense , it can generate an electrical discharge from its electric organs . This species probably bears live young that are sustained by yolk and later histotroph (" uterine milk ") during gestation . The International Union for Conservation of Nature (IUCN) has listed the ocellated electric ray as Vulnerable , as it is susceptible to the heavy trawling activity within its limited range .

= = Taxonomy = =

American ichthyologists David Starr Jordan and Charles Henry Gilbert described the ocellated electric ray in an 1890 article for the scientific journal Proceedings of the United States National Museum . Their account was based on a female specimen caught by the United States Fish Commission steamer USS Albatross in 1888 . The female was collected off the Pacific coast of Colombia at a depth of 60 m (200 ft) . Gilbert had previously obtained a specimen from Panama in 1882 , but it had been destroyed in a fire before it could be studied . Jordan and Gilbert named the new species ommata (Greek for " eyed ") in reference to the distinctive spot on its back , and assigned it to the genus Discopyge . In 1948 , Henry Bryant Bigelow and William Charles Schroeder created the new genus Diplobatis for this species based on then @-@ unique subdivision of its nostrils . Three other species of Diplobatis have since been described from the Atlantic . The Atlantic species more closely resemble each other in morphology than they do the ocellated electric ray , though as a whole all four Diplobatis species are extremely similar . Another common name for this species is " target ray " .

= = Description = =

The pectoral fin disc of the ocellated electric ray is heart- or trowel @-@ shaped and slightly wider than long . A pair of large , kidney @-@ shaped electric organs are visible through the skin on either side of the head . The small eyes are followed by smaller spiracles , which have seven to ten small , rounded projections on their rims . The snout is broadly rounded , with each nostril divided into two openings by a strut . Between the nostrils is a curtain of skin with a smooth to gently wavy posterior margin . The small mouth forms a transverse line ; the edge of the lower jaw is scalloped , and when closed usually conceals the teeth . There are 14 ? 16 tooth rows in each jaw . The small and pointed teeth become progressively longer and sharper towards the back , and are arranged in a quincunx pattern . Five pairs of small gill slits are present on the underside of the disc .

The large pelvic fins originate beneath the disc and have convex trailing margins . Adult males have very short and thick claspers . The broad and flattened tail is shorter than the disc and bears a fold of skin along either side . There are two small dorsal fins , both with rounded to angular apices ; the first is slightly smaller than the second , and its position varies from over to behind the pelvic fins . The caudal fin is triangular with rounded corners , and is roughly symmetrical above and below . The skin is soft and entirely devoid of dermal denticles .

The dorsal coloration of the ocellated electric ray is extremely variable , with the only constant being the large ocellus (" eyespot ") in the middle of the back . The center of the ocellus is black or yellow

, which is surrounded by concentric , alternating dark and light rings that may be either continuous or broken . The remainder of the upper surface is most commonly a shade of light brown with numerous fine dark dots ; there may also be light dots , larger dark spots or blotches , and / or irregular brown marbling . Some individuals are plain light or dark brown with a black ocellus . The portion of the disc in front of the eyes is brown with up to five darker blotches . The dorsal pattern often extends to the ventral fin margins ; the underside is otherwise white to cream @-@ colored . This species grows up to 25 cm (9 @.@ 8 in) long .

= = Distribution and habitat = =

The ocellated electric ray is common in the tropical coastal waters of the eastern Pacific . Its range extends as far north as the Gulf of California and Bahía San Juanico in Baja California Sur , and as far south as Ecuador . A bottom @-@ dwelling species , it has been recorded from the intertidal zone to a depth of 94 m (308 ft) . The favored habitat of this ray is sandy bays , though it can also be found over rubble bottoms , rocky terrain , and rhodolith beds .

= = Biology and ecology = =

Like the rest of its family , the ocellated electric ray can defend itself by producing a moderate electric shock . During the day , this solitary ray spends most of its time lying partially buried in sand , often near rocky reefs . It becomes more active at night , using its pelvic fins to " hop " along the sea floor . It feeds on small crustaceans such as amphipods and shrimp , as well as polychaete worms . Parasites documented from this species include the tapeworms Acanthobothrium dollyae , A. maryanskii , and A. royi , and the fluke Anaporrhutum euzeti . Though reproductive details are unknown , the ocellated electric ray is presumably viviparous , with the developing embryos sustained first by yolk and later by maternally produced histotroph (" uterine milk ") , as in other electric rays . Females mature sexually at under 19 cm (7 @.@ 5 in) long ; the maturation size for males is unknown .

= = Human interactions = =

The shock from the ocellated electric ray is not dangerous to humans . It occasionally appears in the home aquarium trade , but is difficult to keep because it requires live invertebrates for food . The ocellated electric ray and other electric rays are used as model organisms in biomedical research because their electric organs are rich in ion channels and acetylcholine receptors , which play important roles in the human nervous system . The protein agrin , which concentrates acetylcholine receptors during human embryonic development , was first isolated from this species . Though the ocellated electric ray is not utilized economically , it is caught incidentally by shrimp trawlers . Its mortality from fishing has not been quantified but is thought to be high , considering that trawling operations in the Atlantic are known to take Diplobatis species in large numbers . The catch rate is also probably underestimated due to problematic identification . Given the restricted range of this species and the intensity of trawling within its habitat , the International Union for Conservation of Nature (IUCN) has assessed it as Vulnerable .