

= Puffadder shyshark =

The puffadder shyshark or happy Eddie (*Haploblepharus edwardsii*) is a species of catshark , belonging to the family Scyliorhinidae , endemic to the temperate waters off the coast of South Africa . This common shark is found on or near the bottom in sandy or rocky habitats , from the intertidal zone to a depth of 130 m (430 ft) . Typically reaching 60 cm (24 in) in length , the puffadder shyshark has a slender , flattened body and head . It is strikingly patterned with a series of dark @-@ edged , bright orange " saddles " and numerous small white spots over its back . The Natal shyshark (*H. kistnasamyi*) , formally described in 2006 , was once considered to be an alternate form of the puffadder shyshark .

When threatened , the puffadder shyshark (and other members of its genus) curls into a circle with its tail covering its eyes , giving rise to the local names " shyshark " and " doughnut " . It is a predator that feeds mainly on crustaceans , polychaete worms , and small bony fishes . This shark is oviparous and females deposit egg capsules singly or in pairs onto underwater structures . Harmless to humans , the puffadder shyshark is usually discarded by commercial and recreational fishers alike for its small size . It has been assessed as Near Threatened by the International Union for Conservation of Nature (IUCN) , as its entire population is located within a limited area and could be affected by a local increase in fishing pressure or habitat degradation .

= = Taxonomy and phylogeny = =

The first known reference to the puffadder shyshark in literature was by prominent English naturalist George Edwards in 1760 , by the name *Catulus major vulgaris* , of three individuals caught off the Cape of Good Hope that have since been lost . In 1817 , French zoologist Georges Cuvier described this species as " *Scyllium D 'Edwards* " , based on Edwards ' account , though he was not considered to be proposing a true scientific name . In 1832 , German zoologist Friedrich Siegmund Voigt translated Cuvier 's description under the name *Scyllium edwardsii* , thus receiving attribution for the species . However , in 2001 M.J.P. van Oijen discovered that Swiss naturalist Heinrich Rudolf Schinz had provided an earlier translation of Cuvier 's text with the proper scientific name in 1822 , and subsequently the International Commission on Zoological Nomenclature (ICZN) rendered a decision that this species is properly attributed to Schinz . In 1913 , American zoologist Samuel Garman created the new genus *Haploblepharus* for this and other shyshark species .

Two forms of puffadder shyshark were once recognized : " Cape " and " Natal " , which differed in appearance and habitat preferences . In 2006 , the " Natal " form was described as a new species , the Natal shyshark . A 2006 phylogenetic analysis , based on three mitochondrial DNA genes , found that the puffadder shyshark is the most basal member of its family , with a sister relationship to the clade containing the dark shyshark (*H. pictus*) and the brown shyshark (*H. fuscus*) . The Natal shyshark was not included in the study , though it is very close morphologically to this species . The common name " puffadder shyshark " refers to the puff adder (*Bitis arietans*) , a widely distributed African viper with similar coloration . " Happy Eddie " (from the scientific name *Haploblepharus edwardsii*) is used by academics for this shark , and was recently introduced to the public as an easily remembered alternative to the ambiguous vernaculars " shyshark " and " doughnut " , which can apply to several different species and have confounded research efforts .

= = Description = =

The puffadder shyshark is more slender than other shysharks , with a short , broad , dorsally flattened head and a narrowly rounded snout . The large , oval @-@ shaped eyes have cat @-@ like slit pupils , a simple nictitating membrane (a protective third eyelid) , and a prominent ridge underneath . The nostrils are very large , with a pair of greatly expanded , triangular flaps of skin in front that are fused together and reach the mouth . There is a deep groove connecting the excurrent (outflow) opening of each nostril to the mouth , obscured by the nasal flaps . The mouth is short with furrows at the corners on both jaws . There are 26 ? 30 tooth rows in the upper jaw and 27 ? 33

tooth rows in the lower jaw . Tooth shape is sexually dimorphic : those of males are longer and three @-@ pointed , while those of females are shorter and five @-@ pointed . Unusually , the two halves of the lower jaw are connected by a special cartilage , which allows a more even distribution of teeth and may increase bite strength .

The five pairs of gill slits are positioned somewhat on the upper surface of the body . The dorsal , pelvic , and anal fins are all of similar size . The dorsal fins are located far back on the body , the first originating behind the pelvic fin origins and the second behind the anal fin origin . The pectoral fins are broad and of moderate size . The short , broad caudal fin comprises about one @-@ fifth of the body length and has a deep ventral notch near the tip of the upper lobe and a barely developed lower lobe . The skin is thick and covered by well @-@ calcified , leaf @-@ shaped dermal denticles . The dorsal coloration consists of a light to dark brown background with a series of 8 ? 10 striking yellowish to reddish brown " saddles " with darker margins , all covered by a profusion of small white spots . The underside is white . This species attains a length of 60 cm (24 in) , with a maximum record of 69 cm (27 in) . Sharks found west of Cape Agulhas are smaller than those found east , reaching only 48 cm (19 in) long .

= = Distribution and habitat = =

The range of the puffadder shyshark is limited to the continental shelf along the coast of South Africa , from Langebaan Lagoon in Western Cape Province to the western shore of Algoa Bay . Previous records of it being found as far north as Durban are now thought to be misidentifications of other species . This bottom @-@ dwelling shark is most common over sandy or rocky bottoms . It is found in progressively deeper water towards the northeastern portion of its range , from 0 ? 15 m (0 ? 49 ft) off Cape Town to 40 ? 130 m (130 ? 430 ft) off KwaZulu @-@ Natal ; this distribution pattern may reflect this shark 's preference for cooler waters .

= = Biology and ecology = =

Quite common within its small range , the sluggish and reclusive puffadder shyshark is often seen lying still on the sea floor . It is gregarious and several individuals may rest together . A generalist predator with grasping dentition , the puffadder shyshark is known to take a variety of small benthic prey : crustaceans (including crabs , shrimp , crayfish , mantis shrimp , and hermit crabs) , annelid worms (including polychaetes) , bony fishes (including anchovies , jack mackerels , and gobies) , cephalopods (including squid) , and fish offal . Overall , the most important component of this shark 's diet is crustaceans , followed by polychaetes and then fishes . Males seem to prefer polychaetes , while females prefer crustaceans . It has been observed attacking a common octopus (*Octopus vulgaris*) by tearing off an arm with a twisting motion .

The puffadder shyshark is preyed upon by larger fishes , such as the broadnose sevengill shark (*Notorynchus cepedianus*) . The Cape fur seal (*Arctocephalus pusillus pusillus*) has been documented capturing and playing with puffadder shysharks , tossing them into the air or gnawing on them . The shark is often injured or killed during these encounters ; the seal may eat torn @-@ off pieces of flesh , but seldom consumes the entire shark . On occasion , black @-@ backed kelp gulls (*Larus dominicanus vetula*) take advantage of this behavior and steal the sharks from the seals . When threatened or disturbed , the puffadder shyshark adopts a characteristic posture in which it curls into a ring and covers its eyes with its tail ; this reaction is the basis for the common names " shyshark " and " doughnut " , and is likely meant to make the shark harder for a predator to swallow .

The eggs of the puffadder shyshark are fed upon by the whelks *Burnupena papyracea* and *B. lagenaria* , at least in captivity . Known parasites of this species include the trypanosome *Trypanosoma haploblephari* , which infests the blood , the nematode *Proleptus obtusus* , which infests the intestine , and the copepods *Charopinus dalmanni* and *Perissopus oblongatus* , which infest the skin . Another parasite is the praniza larval stage of the isopod *Gnathia pantherina* , which infests the nares , mouth , and gills . The deep @-@ penetrating mouthparts of these larvae

significantly damage local tissue , causing bleeding and inflammation .

== Life history ==

The puffadder shyshark is oviparous ; there is no distinct breeding season and reproduction occurs year @-@ round . Females deposit egg capsules one or two at a time , attaching them to vertical structures such as sea fans . The thin @-@ walled egg cases are brown with distinctive pale transverse bands ; and have a slightly furry texture and long adhesive tendrils at the corners . They are smaller than those of other shyshark species , measuring 3 @.@ 5 ? 5 cm (1 @.@ 4 ? 2 @.@ 0 in) long and 1 @.@ 5 ? 3 cm (0 @.@ 59 ? 1 @.@ 18 in) across . The young shark hatches after three months , and measures around 9 cm (3 @.@ 5 in) long . The length at maturation for both sexes has been reported as anywhere from 35 to 55 cm (14 to 22 in) by various sources ; this high degree of variation may reflect regional differences as sharks from deeper waters in the eastern part of its range seem to mature at a larger size than those from the west . The age at maturation is estimated to be around 7 years , and the maximum lifespan is at least 22 years .

== Human interactions ==

Harmless to humans , the puffadder shyshark can be easily caught by hand . Not targeted by commercial fisheries because of its small size , it is taken incidentally and discarded by bottom trawlers operating between Mossel Bay and East London , and by fishing boats in False Bay . Many are hooked by recreational anglers casting from the shore , who also generally discard or kill them as minor pests . Some local exploitation of this species does occur for lobster bait and the aquarium trade . The International Union for Conservation of Nature (IUCN) has assessed the puffadder shyshark as Near Threatened . Although it remains abundant , the small range of this shark lies entirely within a heavily fished region , and any increase in fishing activities or habitat degradation could potentially impact the entire population .