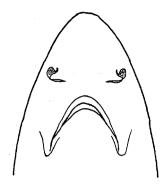
Diagnostic Features: Body fairly slender. Head short, prepectoral length 17 to 22% of total length; snout moderately long and bluntly angular in lateral view, tip rather expanded and bulbous in adults with hypercalcified rostral mass, preoral snout 5.5 to 6.6% of total length, preorbital snout 6.3 to 7.3% of total length; internarial space broad, 2.4 to 2.9% of total length; eyes fairly large, eye length 2.1 to 3 times in preorbital snout and 2.5 to 3.3% of total length; interorbital space 2.4 to 2.9% of total length; mouth moderately long, greater than eye length, its length 2.7 to 3.8% of total length; upper labial furrows about equal to lowers and 1.3 to 2% of total length; teeth molariform and asymmetric, with cusp reduced to a low point, cusplets absent except in very young sharks; buccopharyngeal denticles covering anterior half of palate and mouth floor or entire palate and floor. Interdorsal space 20 to 23% of total length; trailing edges of dorsal fins denticulate, without bare ceratotrichia; first dorsal somewhat falcate, with posterior margin nearly vertical from apex, its midbase closer to pectoral bases than to pelvics; pectoral fins moderate-sized, length of anterior margin



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13 to 15% of total length, width of posterior margin 9.8 to 13% of total length; pelvic fins small, anterior margin length 6.5 to 7.9% of total length; anal height 2.9 to 4.7% of total length; anal caudal space greater or subequal to second dorsal height, and 7.1 to 9.1% of total length; ventral caudal lobe more or less falcate in adults. Crowns of lateral trunk denticles lanceolate or tricuspidate, with longitudinal ridges extending their entire length. Rostral node of cranium, hyomandibulae, scapulocoracoid tips; sometimes supraorbital crests and rostral shafts of cranium, extrabranchial cartilages, and radials of second dorsal, pectoral, pelvic, and caudal fin radials hypercalcified in adults; palatoquadrates not subdivided; monospondylous precaudal centra 25 to 39, diplospondylous precaudal centra 34 to 48, precaudal centra 59 to 81. Colour uniform grey or grey-brown, above, light below, no white or dark spots or dark bars; South African examples generally have white-tipped first dorsal and black-tipped second dorsal and caudal. Development viviparous. Size large, adults 63 to 150 cm.

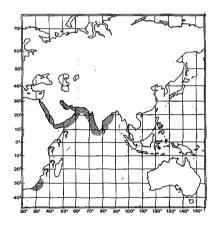
**Geographical Distribution :** Western Indian Ocean: Red Sea and the "Gulf" to India, Pakistan and Sri Lanka; Natal, South Africa (P.C. Heemstra, pers. comm.).

**Habitat and Biology**: A common bottom-dwelling shark of continental waters, found inshore and offshore, some on coral reefs. Viviparous, number of young 6 to 10 per litter. Eats small bottom fish, molluscs, and crustaceans. Readily lives in captivity.

Size: Maximum 150 cm, males maturing between 63 and 67 cm and reaching 106 cm, adult female 82 cm.

**Interest to Fisheries:** Apparently regularly fished off Pakistan and India and used for human food.

Literature: Gohar & Mazhar (1964); Heemstra (1973); Baranes & Ben-Tuvia (1978).



Remarks: This species was included in synonymy of M. punctulatus by Fowler (1941) and generally confused with M. manazo or M. mustelus by various writers until Heemstra 1973) examined its type and concluded that it was a valid species. The heavy hypercalcification of the skeleton of adults of this species is unique in its genus and family, although other carcharhinoids have hypercalcified skeletons (see Compagno, 1979). With present evidence (Heemstra, 1973, pers. comm.), there seem to be isolated populations of this species off Natal, South Africa (the Mustelus species of Bass, D'Aubrey & Kistnasamy, 1975a, which Dr P.C. Heemstra identifies as M. mosis and which the writer has examined and skeletonized) in the Red Sea, and in the "Gulf" and Arabian Sea to southern India and Sri Lanka, though this may be an illusion of inadequate collecting. The writer examined a specimen labelled M. manazo in the Zoological Survey of India, illustrated by Day (1878), and found it to be M. mosis. A. Baranes of the Hebrew University of Jerusalem has done a study of the ecology and behaviour of this species in the Red Sea off Elat, Israel. In Israeli waters off Elat it is called the Moses smooth-hound and off South Africa, the hardnose smooth-hound.

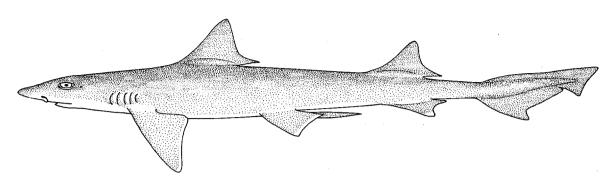
Mustelus mustelus (Linnaeus, 1758)

TRIAK Must 1

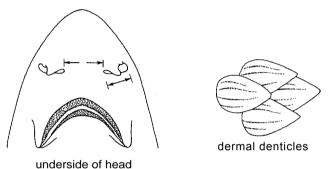
<u>Squalus</u> <u>mustelus</u> Linnaeus, 1758, <u>Syst.Nat</u>., ed. 10, 1:235. Holotype: None. Type Locality: "Habitat in Europa".

**Synonymy : Mustelus Linck**, 1790; ? Mustelus vulgaris Cloquet, 1821; Mustellus Levis Risso, 1826; Mustelus equestris Bonaparte, 1834 (in part; also M. asterias).

FAO Names: En - Smooth-hound; Fr - Emissole lisse; Sp - Musola.



Field Marks: A usually unspotted, large Mustelus with a short head and snout, broad internarial space, large eyes, narrow interorbital space, upper labial furrows slightly longer than lowers, low-crowned teeth with weak cusps, buccopharyngeal denticles confined to extreme front of mouth, lateral trunk denticles usually lanceolate and with complete ridges, unfringed dorsal fins, 70 to 93 precaudal centra, and a semifalcate ventral caudal lobe. It is the only smooth-hound with the above characters where it occurs.



 $\begin{array}{c} \textbf{Diagnostic Features:} \ \, \text{Body fairly slender.} \ \, \text{Head short, prepectoral length 17 to 21\%} \end{array}$ 

of total length; snout moderately long and bluntly angular in lateral view, preoral sno, 5.3 to 7.4% of total length, preorbital snout 5.9 to 8% of total length; internarial space broad, 2.4 to 3% of total length eyes fairly large, eye length about 1.9 to 2.8 times in preorbital snout and 2.3 to 4% of total length; interorbital space narrow, 3.7 to 4.8% of total length; mouth fairly short, length subequal to eye length and 2.2 to 3.5% of total length; upper labial furrows usually slightly longer than lowers and 1.4 to 2.1% of total length; teeth molariform and asymmetric, with cusp reduced to a low point, cusplets absent except in very young sharks; buccopharyngeal denticles confined to tongue tip and extreme anterior end of palate. Interdorsal space 18 to 25% of total length; trailing edges of dorsal fins denticulate, without bare ceratotrichia; first dorsal falcate, with posterior margin almost vertical, midbase closer to pectoral bases than pelvics; pectoral fins moderately large, length of anterior margins 13 to 17% of total length, width of posterior margins 8.2 to 14% of total length; pelvic fins moderately large, anterior margin 6.5 to 9.9% of total length; anal height 2.4 to 4.3% of total length; anal caudal space greater than second dorsal height, and 6.3 to 8.8% of total length; ventral caudal lobe more or less falcate in adults. Crowns of lateral trunk denticles lanceolate or weakly tricuspidate, with longitudinal ridges extending their entire length. Cranium and hyomandibulae not hypercalcified in adults, but scapulocoracoid tips, distal pectoral radials, and hypochordal arches sometimes slightly hypercalcified; palatoquadrates not subdivided; monospondylous precaudal centra 25 to 32, diplospondylous precaudal centra 40 to 66, precaudal centra 70 to 93. Colour uniform grey or grey-brown, above, light below, no white spots or dark bars, some specimens with dark spots. Development viviparous. Size large, adults 70 to at least 164 cm.

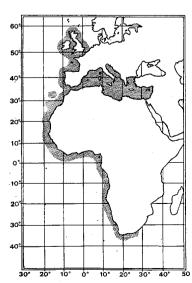
**Geographical Distribution:** Eastern Atlantic: France and British Isles to Mediterranean, Morocco, Canary Islands, Madeira, Angola, South Africa.

**Habitat and Biology**: An abundant shark of the continental shelves and uppermost slopes, most commonly found in shallow water at depths from 5 to 50 m, but often in the intertidal region and ranging to at least 350 m depth; sometimes in midwater but prefers to swim near the bottom.

Viviparous, with a yolk-sac placenta; number of young 4 to 15 per litter. Gestation period about 10 to 11 months.

Primarily a crustacean feeder that eats crabs, lobsters, slipper lobsters, hermit crabs, and shrimps, but also cephalopods (including octopi) and bony fishes (including snake eels). A deep.caught individual (300 m) had a midwater fish (greeneye, Chlorophthalmus) in its stomach.

**Size:** Maximum 164 cm, males maturing between 70 and 74 cm and reaching at least 110 cm, females maturing at about 80 cm and reaching at least 164 cm. Size at birth about 39 cm.



Interest to Fisheries: Fisheries exist for this species in European waters, the Mediterranean, and off West Africa: this shark is very common and is taken in bottom trawls, fixed bottom nets, with line gear, and occasionally even in pelagic trawls. It is utilized fresh and fresh-frozen for human consumption (France, Federal Republic of Germany, Italy), also dried salted and smoked; its liver is used for oil and carcasses for fishmeal. In South Africa, it is commonly taken by sportsfishers from shore on sandy beaches.

Literature: Lozano y Rey (1928); Springer (1939); Bigelow & Schroeder (1948); Poll (1951); Tortonese (1956); Cadenat (1957); Quignard & Capape (1972); Heemstra (1973); Wheeler (1978); Compagno (1981); Cadenat & Blache (1981); L.J.V. Compagno & M. Smale, unpub. data.

**Remarks**: This species is very close to  $\underline{M}$ .  $\underline{canis}$  of the western Atlantic and has been sometimes confused with it, but, according to Heemstra (1973), it differs in having somewhat shorter upper labial furrows, a narrower internarial, and fewer vertebrae.

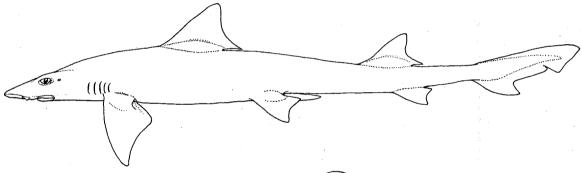
## Mustelus norrisi Springer, 1940

TRIAK Must 16

<u>Mustelus</u> <u>norrisi</u> Springer, 1940, <u>Proc.U.S.Nati.Mus.</u>, 86(3058):462, figs 53, 55. Holotype: US National Museum of Natural History, USNM 107739, 723 mm adult male. Type Locality: Off Englewood, Florida

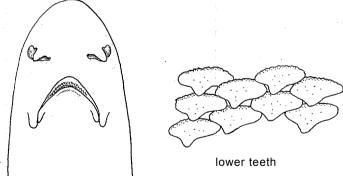
Synonymy: None.

FAO Names: En - Narrowfin smooth-hound: Fr - Emissole veuve; Sp - Musola viuda.



**Field Marks:** An unspotted <u>Mustelus</u> with a short, narrow head, narrow internarial space, relatively large eye, long mouth, upper labial furrows shorter than lowers, strongly falcate fins and 87 to 100 precaudal vertebral centra.

Diagnostic Features: Body fairly slender. Head short, prepectoral length 16 to 20% of total length; snout moderately long and bluntly angular in lateral view, preoral snout 4.2 to 6.5% of total length, preorbital snout 5.9 to 7.2% of total length; internarial space narrow, 2.3 to 2.9% of total length; eyes fairly large, eye length 2.1 to 2.7 times in preorbital snout and 2.3 to 3.4% of total length; interorbital space narrow, 3.3 to 4.2%



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of total length; mouth length greater than eye length, and 2.5 to 3.7% of total length; upper labial furrows as long as lowers and 1 to 1.7% of total length; teeth molariform and asymmetric, with cusp reduced to a low point; buccopharyngeal denticles covering anterior half of palate and floor of mouth. Interdorsal space 18 to 26% of total length; trailing edges of dorsal fins denticulate, without bare ceratotrichia; first dorsal falcate, with posterior margin nearly vertical from apex, its midbase about equidistant between pectoral and pelvic bases; pectoral fins fairly small, length of anterior margins 12 to 15% of total length, width of posterior margin 7.9 to 12% of total length; pelvic fins fairly small, length of anterior margins 6.7 to 8.5% of total length; anal height 2,6 to 3.7% of total length; anal-caudal space greater than second dorsal height, and 7.3 to 9.7% of total length; ventral caudal lobe strongly falcate in adults. Crowns of lateral trunk denticles lanceolate, with longitudinal ridges extending their entire length. Skeleton not hypercalcified in adults; palatoquadrates not subdivided; monospondylous precaudal centra 33 to 38, diplospondylous precaudal centra 54 to 65, precaudal centra 87 to 100. Colour uniform grey above, light below, no white or dark spots or dark bars, but tips of dorsal and caudal fins dusky in newborn young. Development viviparous. Size moderately large, adults 50 to 100 cm.

**Geographical Distribution :** Western Atlantic: Florida and northern Gulf of Mexico to Venezuela; southern Brazil.

**Habitat and Biology**: A common tropical-subtropical bottom-dwelling shark of the continental shelves, found on sand and mud bottoms from close inshore to at least 80 m depth. The species is thought to be migratory in the Gulf of Mexico, moving inshore into water shallower than 55 m in the winter months and apparently retreating into deeper water in other seasons (Heemstra, 1973).

Viviparous, with a yolk-sac placenta; number of young 7 to 14 per litter.

Eats mostly crabs and shrimp, but also small bony fishes.

**Size:** Maximum about 100 cm, males maturing at about 58 cm, females at about 65 cm; size at birth 30 cm.



Interest to Fisheries: Probably regularly taken within its range, but details of commercial fisheries are lacking.

Literature: Springer (1939); Clark & van Schmidt (1965); Cervigón (1966); Heemstra (1973).

**Remarks :** Close to the larger, stockier <u>Mustelus</u> <u>canis</u>, and compared with it under that species. See Heemstra (1973) for a discussion of the characters separating the two species.

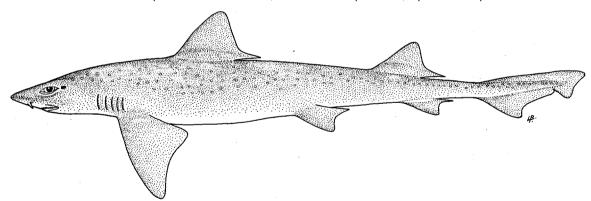
Mustelus palumbes Smith, 1957

**TRTAK Must 17** 

<u>Mustelus palumbes</u> Smith, 1957, <u>S.Afr.J.Sci</u>, 53:358, figs 2E-F. Holotype: J.L.B. Smith Institute of Ichthyology, Grahamstown, South Africa, RUSI 24, 990 mm female (head, tail, and fins preserved). Type Locality: Knysna estuary mouth, South Africa, in shallow water.

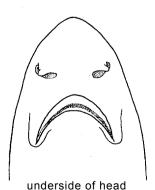
Synonymy: None

FAO Names: En - Whitespotted smooth-hound; Fr - Emissole palombe; Sp - Musola paloma.



**Field Marks :** A fairly large, usually white-spotted <u>Mustelus</u> with a relatively broad internarial space, buccopharyngeal denticles covering almost entire oral cavity, unfringed dorsal fins, relatively large pectoral and pelvic fins, and 74 to 88 precaudal centra. It is the only white-spotted smooth-hound in southern African waters.

**Diagnostic Features**: Body fairly slender. Head short, prepectoral length 17 to 21% of total length; snout moderately long and bluntly angular in lateral view, preoral snout 6 to 7.4% of total length, preorbital snout 6.1 to 7.5% of total length; internarial space broad, 2.4 to 3% of total length; eyes fairly large, eye length 1.7 to 2.4 times in preorbital snout and 2.8 to 4% of total length; interorbital space moderately narrow, 3.7 to 4.7% of total length; mouth short, subequal to eye length. and 2.6 to 3.3% of total length; upper labial furrows longer than lowers and 1.7 to 2.5% of total length; teeth



molariform and asymmetric, with cusp reduced to a low point, cusplets absent except in very young sharks; buccopharyngeal denticles covering almost entire palate and floor of mouth. Interdorsal space 18 to 23% of total length; trailing edges of dorsal fins denticulate, without bare ceratotrichia; first dorsal broadly triangular, with posteroventrally sloping posterior margin, its midbase closer to pectoral bases than pelvics; pectoral fins large, length of anterior margins 14 to 18% of total length, width of posterior margin 12 to 16% of total length; pelvic anterior margins 6.4 to 9.3% of total length; anal height 3.2 to 4.1% of total length; anal-caudal space greater than second dorsal height, and 7 to 8.8% of total length; ventral caudal lobe somewhat expanded and sometimes semi falcate in adults. Crowns of lateral trunk denticles lanceolate or weakly tricuspidate, with longitudinal ridges confined to their anterior halves or extending their entire length. Skeleton not hypercalcified in adults; palatoquadrates not subdivided; monospondylous precaudal centra 36 to 40, diplospondylous precaudal centra 43 to 52, precaudal centra 74 to 88. Colour uniform grey or grey-brown above, light below, usually with numerous small white spots but no dark spots or dark bars. Development ovoviviparous. Size large, adults 76 to 120 cm.

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**Geographical Distribution:** Eastern South Atlantic and southwestern Indian Ocean: Namibia, South Africa and extreme southern Mozambique.

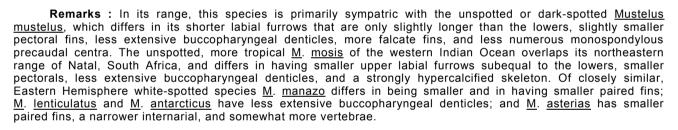
**Habitat and Biology**: A common inshore and offshore temperate-water shark of the continental shelf and upper slope, on or near bottom at depths from the intertidal region down at least to 360 m depths. Prefers sand and gravel bottoms.

Ovoviviparous, without a yolk-sac placenta; number of young 3 to 8 per litter. Eats crabs and probably other invertebrates.

Size: Maximum about 120 cm; adults females 79 to 102 cm, adult males 76 to 88 cm.

Interest to Fisheries: Limited, often taken by sports anglers and by commercial bottom trawlers, but usually discarded although excellent eating. Some may be utilized in a local fishery that processes sharks for 'biltong', dried shark meat or jerky, for human consumption.

Literature: Heemstra (1973, and pers. comm.); L.J.V. Compagno & M. Smale, unpub. data.



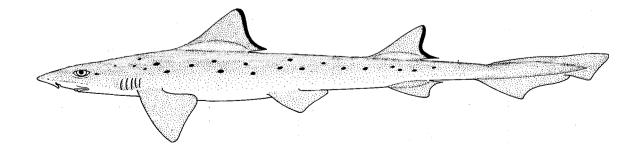
Mustelus punctulatus Risso, 1826

TRIAK Must 18

<u>Mustellus punctulatus</u> Risso, 1826, <u>Hist.Nat.princ.prod.Europe Mered.</u>, 3:128. Holotype: Female of 640 mm, lost? Type Locality: ? Nice, France, Mediterranean Sea.

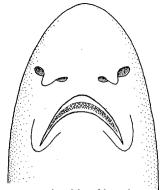
Synonymy: <u>Mustelus mediterraneus</u> Quignard & Capape, 1972.

FAO Names: En - Blackspotted smooth-hound; Fr - Emissole pointillée; SP - Musola pimienta.



**Field Marks**: A usually black-spotted smallish <u>Mustelus</u> with a short head and snout, narrow head and internarial, large eyes, upper labial furrows somewhat longer than lowers, low-crowned teeth with weak cusps, buccopharyngeal denticles confined to front of mouth, lanceolate lateral trunk denticles with incomplete ridges, and prominently fringed dorsal fins.

**Diagnostic Features**: Body fairly slender. Head short, prepectoral length 17 to 20% of total length; snout moderately long and bluntly angular in lateral view, preoral snout 5.6 to 7.5% of total length, preorbital snout 6.1 to 7.3% of total length; internarial space narrow, 1.9 to 2.3% of total length; eyes fairly large, eye length 2.1 to 2.8 times in preorbital snout and 2.3 to 3.6% of total length; interorbital space, 3.7 to 4.4% of total length; mouth short, subequal to eye length and 2 to 3.1% of total length; upper labial furrows definitely longer than lowers and 1.7 to 2.2% of total length; teeth molariform and asymmetric, with cusp reduced to a low point; distal cusplets absent except in very young sharks; buccopharyngeal denticles confined to tongue and

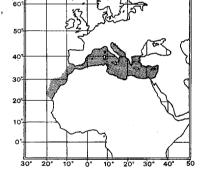


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anterior third of palate. Interdorsal space 18 to 22% of total length; trailing edges of dorsal fins naked, with a prominent band of dark, bare ceratotrichia; first dorsal broadly triangular, with posteroventrally sloping posterior margin, its midbase closer to pelvic bases than to pectorals; pectoral fins fairly small, anterior margin lengths 12 to 14% of total length, width of posterior margins 7.2 to 11% of total length; pelvic fins small, anterior margin length 7.4 to 8.8% of total length; anal height 2.3 to 3.4% of total length; anal-caudal space greater than second dorsal height, and 6 to 8.2% of total length; ventral caudal lobe falcate in adults. Crowns of lateral trunk denticles lanceolate, with or without weak ridges that, when present, extend at most only half their length. Cranium, hyomandibulae, and scapulocoracoids not hypercalcified in adults; palatoquadrates not subdivided; monospondylous precaudal centra 32 to 37, diplospondylous precaudal centra 41 to 50, precaudal centra 78 to 84. Colour uniform grey or grey-brown above, light below, often with small black spots but without white or dark bars. Development uncertain. Size moderate, adults 50 to 90 cm.

**Geographical Distribution :** Eastern North Atlantic: Western Sahara, Mediterranean.

Habitat and Biology: An inshore, continental bottom-dwelling shark. Habits are little known because of confusion with the more common Mustelus mustelus, but presumably this species is viviparous. Data for Mustelus mediterraneus may apply in part to this species; this suggests a gestation period of about a year and a maturation time of 1 to 2 years, although this remains to be confirmed from direct ageing methods. Probably a crustacean-feeder.



**Size:** Maximum at least 95+ cm, males mature at 50 to 55 cm, females at about 60 cm; size at birth about 31 cm.

**Interest to Fisheries:** Probably regularly captured and utilized for human consumption in the Mediterranean, but details not certain because of confusion of this species with <u>M</u>. <u>mustelus</u>.

Literature: Quignard & Capape (1972); Heemstra (1973); Compagno (1981); Francis (1981).

**Remarks:** See Heemstra (1973) for a. discussion of the systematics and nomenclature of this species. Previously, Quignard & Capape (1972) had described a new species,  $\underline{\text{Mustelus}}$   $\underline{\text{mediterraneus}}$ , which Heemstra considers in part referable to  $\underline{\text{M}}$ .  $\underline{\text{punctulatus}}$ .

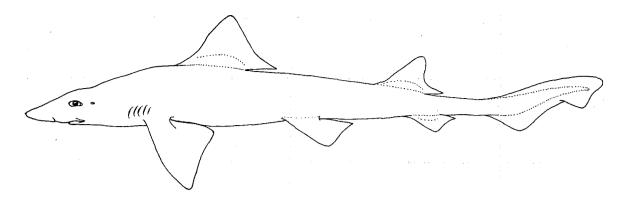
Mustelus schmitti Springer, 1940

TRIAK Must 19

<u>Mustelus</u> <u>schmitti</u> Springer, 1940, <u>Proc.U.S.Natl.Mus.</u>, 86(3058):465. Holotype: U.S. National Museum of Natural History, USNM 107740, 742 mm adult male. Type Locality: Off coast of Uruguay.

Synonymy: None.

FAO Names: En - Narrownose smooth-hound; Fr - Emissole gatuso; Sp - Musola gatusa.



**Field Marks:** A white-spotted <u>Mustelus</u> with a very narrow internarial space and dorsal fins with naked ceratotrichia on margins.

Diagnostic Features: Body fairly slender. Head short, prepectoral length 17 to 21% of total length; snout moderately long and bluntly angular in lateral view, preoral snout 5.7 to 7.4% of total length, preorbital snout 5.8 to 7.8% of total length; internarial space very narrow, 1.8 to 2.4% of total length; eyes fairly large, eye length 2 to 3.1 times in preorbital snout and 2.1 to 3.5% of total length; interorbital space fairly narrow, 4.3 to 5.3% of total length; mouth short, subequal to eye length and 2.3 to 3.2% of total length; upper labial furrows considerably longer than lowers and 1.8 to 2.6% of total length; teeth molariform and asymmetric, with cusps low and rounded; buccopharyngeal denticles not known. Interdorsal space 17 to 23% of total length; trailing edges of dorsal fins naked, with a band of bare ceratotrichia; first dorsal broadly triangular, with posteroventrally sloping posterior margin, its midbase closer to pelvic bases than to pectorals; pectoral fins fairly small, length of anterior margins 12 to 16% of total length, width of posterior margin 8.6 to 13% of total length; pelvic fins small, anterior margin length 6.7 to 8.7% of total length; anal height 2.5 to 3.5% of total length; anal caudal space slightly greater or subequal to second dorsal height, and 5.8 to 7.8% of total length; ventral caudal lobe not expanded and falcate in adults. Crowns of lateral trunk denticles lanceolate, with longitudinal ridges extending at least half their length. Cranium, hyomandibulae, scapulocoracoids not hypercalcified in adults; palatoquadrates not subdivided; monospondylous precaudal centra 36 to 39, diplospondylous precaudal centra 45 to 54, precaudal centra 82 to 88. Colour grey above, light below, often with numerous white spots but no dark spots or dark bars. Development ovoviviparous. Size moderate, adults 48 to 74 cm.

 $\textbf{Geographical Distribution:} \ \ \textbf{Western South Atlantic: Southern Brazil to northern Argentina.}$ 

**Habitat and Biology:** A common bottom-dwelling shark of the continental shelf of Atlantic South America, at depths of 60 to 195 m. Ovoviviparous, without a placenta, 2 to 7 pups per litter. Eats crabs and probably other crustacea, and presumably small fishes.

Size: Maximum at least 74 cm; males maturing at about 48 cm and females at about 55 to 60 cm; size at birth 26 cm.

Interest to Fisheries: An important fishery for this species exists off Argentina, 9000 metric tons catch being reported for 1975 and 5981 metric tons for 1978 (FAO Yearbook of Fishery Statistics, 1978). The species is also regularly caught off Uruguay, and utilized there for meat (marketed fresh and dried salted for human consumption) and oil.

Literature: Springer (1939); Bigelow & Schroeder (1940, 1948); Heemstra (1973).

Remarks: A distinctive species, not close to any of the other white-spotted ovoviviparous smooth-hounds.

Mustelus whitneyi Chirichigno, 1973

TRIAK Must 20

Mustelus whitneyi Chirichigno, 1973, Inf.Inst.Mar, Peru, (42):1, 6-7, figs 1-3. Holotype: Instituto del Mar del Peru, IMARPE 1210, 645 mm adult male. Type Locality: Off Paita, Peru, 92 m depth.

Synonymy: None.

FAO Names: En - Humpback smooth-hound; Fr - Emissole piruche; Sp - Musola prieta.