First record of the deep-sea eel *Ilyophis saldanhai* (Synaphobranchidae, Anguilliformes) from the Pacific Ocean

by

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RÉSUMÉ. - Première capture de l'anguille des profondeurs *Ilyophis saldanhai* (Synaphobranchidae, Anguilliformes) dans l'océan Pacifique.

Un spécimen d'*Ilyophis saldanhai*, Karmovskaya & Parin, 1999, a été récolté sur la dorsale de l'océan Pacifique oriental sur le site hydrothermal Grommit (21°33,66'S-114°17,98'W, 2838 m de profondeur), en avril 2004, au cours de la campagne BIOSPEEDO (CNRS-Ifremer). Cette espèce, connue jusque-là seulement du champ hydrothermal Broken Spur (29°08'N-43°13'W, 3100 m de profondeur) sur la ride médio-atlantique, est signalée pour la première fois dans l'océan Pacifique.

Key words. - Synaphobranchidae - *Ilyophis saldanhai* - PSE - South East Pacific Ridge - Hydrothermal vent - New Record.

The eel family Synaphobranchidae, containing 11 genera and 30 species, distributed among three subfamilies (Robins and Robins, 1989), is an important ecological component of the bathydemersal fauna and at least one genus and species (*Thermobiotes mytilogeiton* Geistdoerfer, 1991) can be considered endemic to hydrothermal vent environments (Geistdoerfer, 1988). However, despite its importance, our knowledge of the Synaphobranchidae remains limited to the morphological and trophic levels (Sulak and Shcherbachev, 1997). Although most of the known species have very wide distributions, others are restricted to very specific zones, for example, the proximity of hydrothermal vents. This is the case of *Ilyophis saldanhai* Karmovskaya & Parin, 1999, one of the six known species of this genus described from the Broken Spur hydrothermal vent field in the Mid-Atlantic Ridge (MAR) and based on specimens collected by the R/V "Akademik Mstislav Keldysh" during the years 1994 and 1996, in particular in the vicinity of the smoker Saracen Head, (29°08'N-43°13'W, 3020-3100 m) (Karmovskaya and Parin, 1999).

The specimen reported here extends considerably the known distribution of this species to the Pacific Ocean.

A comparison between the specimen from the South East Pacific Rise (SEPR) and one specimen of *I. saldanhai* from the Broken Spur and two specimens of *I. arx* Robins, 1976 from the eastern Pacific, was made in order to allow a clear identification. Some ecological notes and *in situ* observations are also provided.

MATERIAL AND METHODS

The specimen was collected in a baited trap (bait: meat and fish) moored on the hydrothermal vent site Grommit (East Pacific Ridge, 21°33.66'S, 114°17.98'W, 2838 m), during the French diving cruise BIOSPEEDO, of the R/V "L'Atalante" with the DRV "Nautile", from 31 March to 13 May 2004 (Jollivet *et al*., 2004). The objective of this cruise was the study of the biodiversity and geodiversity of the hydrothermal vents along the East Pacific Rise between 7°24'S and 21°33'S.

Counts and measurements follow Robins and Robins (1970) and Karmovskaya and Parin (1999). Vertebrae counts were taken from radiographs. In the description, terminology and structure follow Karmovskaya and Parin (1999) completed with meristic and morphometric data from our specimen.

Comparative material of *I. saldanhai* was borrowed from the Museu Municipal do Funchal (História Natural) (MMF) and of *I. arx* from the Academy of Natural Sciences of Philadelphia (ANSP) and Scripps Institution of Oceanography (SIO).

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(Figs 1, 2)

Material examined

One specimen, 335 mm TL, MNHN 2004-2036, BIOSPEEDO Cruise (CNRS-Ifremer), R/V "L'Atalante", "Nautile" dive PL 1587, 17 April 2004, close to a black smoker at the SEPR Grommit vent site (21°33.66'S-114°17.98'W, 2838 m) with a baited trap (Fig. 3).

Comparative material

Ilyophis arx, 2 specimens: Paratypes, ANSP 133809, 353 mm TL, Galápagos Islands, Eastern Pacific Ocean, 01°48'S-90°19'W, 3225 m depth, collected on 26 May 1966, R/V "Anton Brunn" station 619A; SIO 68-494, 531 mm TL, Eastern Pacific Ocean, South

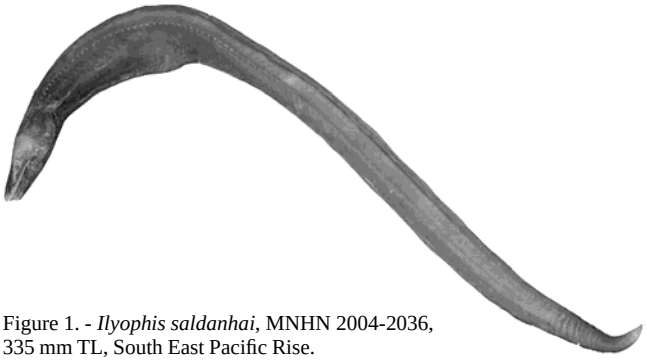

Figure 1. - *Ilyophis saldanhai*, MNHN 2004-2036, 335 mm TL, South East Pacific Rise.

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Figure 2.- Head of *Ilyophis saldanhai*, MNHN 2004-2036, 335 mm TL, South East Pacific Rise.

of Palmer Seamount, station 58, 28°43'N-177°52.30'W, 1300 m depth, collected on 23 Sept. 1968 by R.H. Rosenblatt, R/V "Alexander Agassiz", cruise Styx VII.

Ilyophis saldanhai, 1 specimen: MMF 27081, 412 mm TL, Broken Spur, Mid-Atlantic Ridge, 29º08'N, 43º13'W, 3020 m deep, collected 1 Oct. 1994 by P.A. Tyler, R/V "Akademik Mstislav Keldysh" and D/S "MIR", BRAVEX/94 cruise, station AMK 3434, baited trap close to the smoker "Saracen Head" (2.0-2.5 m).

Description

Body elongated, compressed and naked. Origin of dorsal fin above the 11th pore of the lateral line and behind the posterior end of pectoral fin, origin of anal fin after the 32nd pore of the lateral line, both fused with caudal fin. Total number of vertebrae: 131, including 11 anteriorly to the origin of the dorsal fin. Head well differentiated from the rest of the body, its profile slightly convex at level of posterior margin of orbit. Head 3.3 times in pre-anal length. Snout length moderate (2.65 times in head). Fleshy tip of snout with two pairs of well-developed plicae. Two sharply pronounced medial folds descending from tip of snout; at its lower edge, then bending horizontally to the right and left of median line of snout. Two other shorter lyre-shaped folds situated laterally to two median folds. Supra-orbital canal with 3 pores, postorbital canal with 2 pores, infra-orbital canal with 5 pores, preoperculo-mandibular canal with 8 pores, 6 before the commissure, the 7th at the level of the commissure and the 8th on the preopercle. Mouth opening straight, its rictus situated behind a vertical through posterior margin of orbit. Mouth cavity covered with longitudinal folds bearing numerous papillae that differ in size and shape. Teeth in jaws conical, pointed, slightly curved, bent inside, and closely set in rows forming a band on each jaw. Teeth increasing in size in inner rows and medially on each jaw. Teeth on palate larger. Teeth on vomer forming two irregular longitudinal rows. Eyes small, round, covered with a thin membrane, their diameter 6.7 times in head and 2.5 times in snout. Anterior nostrils tubular, directed forward, bearing small flaps. Openings of posterior nostrils simple and round, their indented margins slightly turned out. Gill slits semicircular, situated horizontally at lower part of head before bases of pectoral fins.

Measurements and counts are given in table I.

DISCUSSION

Our specimen agrees well with the description of *I. saldanhai* given by Karmovskaya and Parin (1999) and differs from the very similar *I. arx* in having the origin of dorsal fin situated behind the posterior end of pectoral fin and associated with the 11th vertebra (10th in *I. arx*), 11 pores on lateral line anteriorly to dorsal fin origin (6 in *I. arx*), 2 postorbital pores (1 in *I. arx*) and lower number of folds on tip of snout (4 *versus* 6). Other differences are shown in table I.

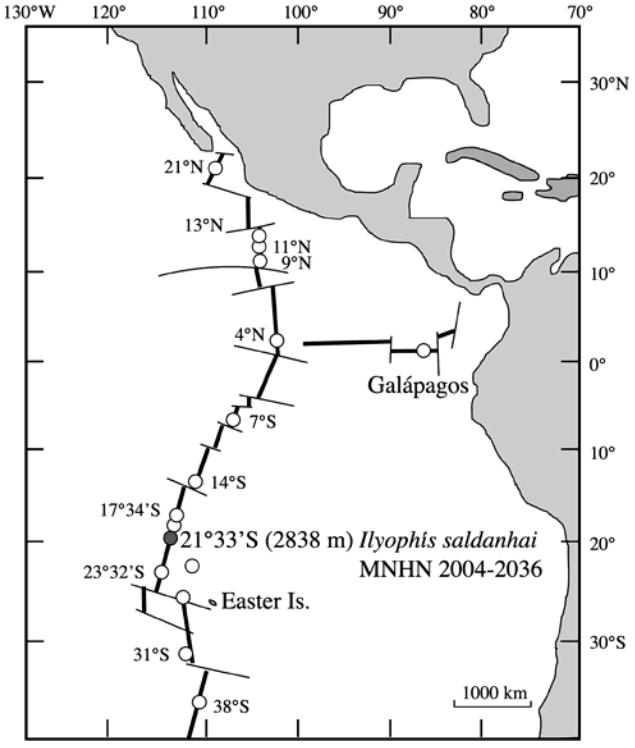

Figure 3. - Map of the East Pacific Rise with the locations of all hydrothermal vent known to date and location of the collection of *I. saldanhai*. *[Carte de la ride Pacifique Est montrant l'emplacement des sources hydrothermales et des lieux de collecte de* I. saldanhai.*]*

The enormous geographical range extension in the distribution of this species, demonstrated by the collection of this specimen, has no simple, straightforward explanation. Since one of the main characteristics of the hydrothermal vent fauna is the high degree of endemism, with over 75% of the vent species occurring at only one site (Tunnicliffe *et al*., 1998) and although some vent endemic fish species such as *Thermarces cerberus* Rosenblatt & Cohen, 1986, have a wide distribution (East Pacific Rise 21ºN to 9ºN and Galápagos Rift) (Biscoito *et al*., 2002), there is no documented case of the same vent endemic fish species occurring at more than one ocean basin. Therefore we may well be in the presence of a bathyal species that can live near an active hydrothermal vent and even feed on hydrothermal vent preys, but it is not vent endemic. Cases like this have been well documented for the Mid-Atlantic Ridge (Saldanha and Biscoito, 1997; Marques and Porteiro, 2000) and elsewhere (Geistdoerfer, 1988). Moreover, synaphobranchids, a major component of the deep-sea fish fauna (Sulak and Shcherbachev, 1997), have been recorded quite often in the vicinity of hydrothermal vents (Saldanha and Biscoito, 1997; Segonzac, pers. comm., 2005).

The distribution of this species is obviously much larger than previously thought and has a particular importance in terms of adding a new family record for the southeastern Pacific, an area where not many species of this family have been recorded (Sulak and Shcherbachev, 1997).

Tableau I. - Measurements and counts of specimens of *Ilyophis saldanhai* and *I. arx* studied. *[Mensurations et données numériques des spécimens étudiés d'*Ilyophis saldanhai *et* I. arx.*]*

	Ilyophis saldanhai		*Ilyophis arx*	
	MNHN 2004-2036	MMF 27081	SIO 68-494	ANSP 133809
Characters				
TL (mm)	335	412	531	353
% TL				
Head length	9.88	11.15	10.94	10.00
Body length	20.72	-	23.46	17.44
Prepectoral length	12.48	12.75	13.40	11.85
Predorsal length	15.61	16.10	18.42	15.00
Preanal length	32.07	30.88	34.54	33.00
Dorsal fin origin	Behind the pectoral fin	Behind the pectoral fin	Before the pectoral fin	Before the pectoral fin
% head length				
Snout length	37.72	37.33	44.74	35.00
Eye diameter	14.95	12.40	8.21	13.00
Postorbital distance	50.38	51.07	60.40	58.51
Length of gape	61.79	61.51	59.58	67.00
Length of gill slit	11.36	11.26	11.00	9.30
Interorbital distance	19.06	17.59	25.33	18.00
Length of pectoral fin	28.66	25.32	26.14	25.00
Counts				
Number of pores in lateral line before vent	32	32	Not counted	32
Number of pores in lateral line before origin of dorsal fin	11	11	Not counted	6
Number of pores in supraorbital canal	3	3	Not counted	3
Number of pores in postorbital canal	2	2	1	1
Number of pores in infraorbital canal	5	5	Not counted	6
Number of pores in preoperculo-mandibular canal	8	8	Not counted	9
Total number of vertebrae	131	131	Not counted	135
Number of vertebrae before origin of dorsal fin	11	11	Not counted	10
Number of folds on the tip of snout	4	4	Not counted	6

Ecological remarks

The specimen was collected at the site Grommit, characterized by some small active black smokers and a large edifice of extinct chimneys. The vent community of this site is largely dominated by the mytilid bivalve *Bathymodiolus thermophilus* among which a transparent hydrothermal fluid of low temperature is diffusing (2 to 5°C). On these mussel beds occur the black gastropod *Eosipho auzendei* (Warén, pers. comm., 2005), white octopuses *Vulcanocto - pus hydrothermalis*, bythograeid crabs *Bythograea* spp., the galatheid crab *Munidopsis subsquamosa*, shrimps *Nemato - carcinidae* spp., and several fish species that also occur on the periphery of the mussel bed, among basalt falls: some rare bythitids *Gerhardia hollisi* (Nielsen and Cohen, 2005), numerous ophidiids (Nielsen, pers. comm., 2005), and hagfish.

Nothing can be said about the feeding habits of *I. saldanhai* in these vents, as only one specimen has been collected to date and its gut contents were not examined. It may well feed on small crustaceans, such as amphipods that are locally very abundant, as well as on small molluscs.

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