

Sense-organ-like parietal pits, sporadically occurring, found in Psammophiinae (Serpentes, Colubridae)

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Abstract. Minute, sense-organ-like parietal pits are reported for several psammophine snakes of Bogert's (1940) African colubrid group XVI. Such pits do not occur not in all individuals, and unrelated to sex. If present, one to four pits are detectable per head, which most often are symmetrically disposed. Further research is required to clarify the function and why these pits are only sporadically occurring.

Minute, sense-organ-like parietal pits (PPs) appear to occur in several psammophine snakes which belong to the Bogert (1940) African colubrid group XVI. The pits have so far been found in *Dromophis lineatus* (Lined Olympic snake), *Malpolon monspessulanus* (Montpellier snake), several *Psammophis* species and *Rhamphiophis rubropunctatus*. However, they do not occur in all individuals, which is unrelated to sex. Their sense-organ-like internal structure has only been documented by microscopic photography of its "print" which is detectable in shed skins (De Haan, 2003-b). If present, PPs are in numbers of one to four per head; most frequently two, one in each parietal shield. They are most often symmetrically disposed, as shown in Fig.1(right), in a *Malpolon monspessulanus*. In this species, distributed in mediterranean type climate in N-Africa, SW-Asia and S-Europe, the frequency of PP-occurrence found in 100 randomly chosen, mostly wild individuals, and examined through their shed skins, was 9%. In 100 mostly congenial, captive *Psammophis phillipsi* individuals it was 60%. In *Psammophis schokari*, no PPs were found in the only ones examined so far: 21 rather congenial, captive individuals.

The reason why the PPs are sporadically occurring is fully obscure. Their equally enigmatic function does not seem to be related to any 'rubbing' behaviour typical for psammophines (cf. previous note), nor to the classically reported snake upper-head 'pits' (as in *Dasypeltis* and *Mehehya* sp.), which for the rest are not genuine pits (cf. De Haan, 2003-b).

Noticing PPs in dark pigment-spotted parietal shields as in Fig.1(left) is not evident. In Fig.1, the typical

female did not present any 'hidden' pit in the parietal shields, while the typically unspotted male upper-head showed presence of PPs in an evident way. (In *M. monspessulanus*, pronounced sexual dimorphism both in pigmentation and growth has been pointed out by De Haan, 1993-1999).

PP orifices vary in shape per individual snake, but do not change otherwise, except in growing with the overall head growth: their usual \emptyset is about 0.1 mm in small (30cm sv+t L) to 0.6 mm in big (>150cm sv+t L) individuals. Pits with a \emptyset twice as large as usual or even shaped as rather long slits exist, but seem to be rare. However, Chirio and Ineich (1991) presented a drawing of the holotype of the psammophine species *Rhamphiophis maradiensis* in which the parietal shields show symmetrically, which I presume to be two common PPs ('pits') and two uncommon ones ('slits').

If pits or slits in parietal shields are not symmetrically disposed, there is some more chance that they are not the PPs at issue, but banally due to injuries. Identifying their quality is relatively easy in live psammophines, that are kept in captivity for at least one skin shedding period in order to obtain and examine microscopically their subsequent slough.

Otherwise, preserved shed skins found in the field, e.g. 6 to 60 at the same time and place mid-summer, from about ten days young *M. monspessulanus* (6 to 12 indiv. per lay), may also be of use to PP-discoveries (Details in De Haan, 2003-b).

So far, low-budget histological examinations of some PP presenting psammophine heads, did not provide any unriddling result. Looking for and reporting on presence of parietal pits (PPs *sensu* De Haan, 2003-b) in psammophine individuals or any other snake, encountered in the field or preserved in a museum collection, as well as investigation of the PP-structure by sensorial physiologists, would be extremely useful.

Figure 1. *Malpolon monspessulanus*. Head of a female (left) and the parietal region of a male with PPs (right).



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Addendum

Even though we have not seen any thorough histological research on both the periodical ILOs and the sporadic PPs, it seems to me that an ILO (infralabial outlet) is induced when a *Psammophis* bites itself with one or two mid-maxillary teeth while keeping its mouth closed. The secretion that comes out extrabuccally may be 'regular' saliva, perhaps mixed with a product from Duvernoy's or another special gland. Based on continuing behavioural observations, the supposed function of the ILO secretion is more and more plausible, viz. marking of conspecific individuals, balancing in tree or bush, by rendering them vomerolingually identifiable. In contrast, the enigmas

around the PPs (parietal pits) still remain, except perhaps the one which is their sporadic occurrence.

Recently, findings possibly dealing with ILOs and PPs (*sensu* De Haan 2003) came to my attention, in particular those described and pictured by Miralles & Ineich (2006)*). The authors state that they have discovered structures in the Asiatic non-psammophine colubrid *Atretium schistosum* which are similar in shape and occurrence to the ILOs and the PPs described for Psammophiinae by De Haan (2003a+b). Indeed, two out of 12 in alcohol preserved *A. schistosum* show parietal pits (PPs), which from the outside look like those described by De Haan (2003b). Since naturally shed parietal epiderm or histological insight were not available, nothing is said about the *Atretium* PPs' internal aspect. In the meantime I (unpubl.) have found sporadically occurring PPs in two out of 9 individuals of another Asiatic non-psammophine colubrid, the *Orthriophis taeniurus* (formerly *Elaphe taeniura*). Thanks to shed skins presenting "prints" of their internal sides, the PPs show microscopic traits of an organoid structure. This internal structure requires further investigation, but so far does not seem similar to that of the psammophine PPs. Externally, however, the *Orthriophis* PPs are similar to common parietal pits and less common slits in both psammophines and *Atretium*.

On the other hand, concerning the "gular pits" of *Atretium*, I must stress that these are quite wrongly placed in the same paper by Miralles & Ineich (2006). Indeed, as the authors report gular pits equivalent to the "exclusive" psammophine "gular pits", found in 10 out of the same 12 *Atretium schistosum*, they confusingly call these pits also "small protuberances" and picture them as 1-3 minute circles on almost each scale of the snake's gular region. So, the *Atretium* gular pits may be novel pits or classic protuberances, but are in no way similar to the psammophine infralabial outlets (ILOs), not even when pseudonymized as "psammophine gular pits".

Apart from unfortunate quoting De Haan's (2003a+b) papers and indicating possible novelties, the *Atretium* article offers a plausible atavism hypothesis to explain the sporadic occurrence of the PPs actually known, and those expected to be found in more snakes, especially from basal lineages.

*) Miralles, A., Ineich, I. (2006): Presence of gular and parietal pits in *Atretium schistosum* (Serpentes, Colubridae), a singular trait not exclusive to psammophine snakes. C. R. Biologies 329 (2006): 180-184.