

gehoben, beziehungsweise modifiziert werden. Dabei ist die Farbe des Milieu nach Schröder's Ueberzeugung „als das allein Wirkende anzusehen“ (S. 63). In seiner einseitigen Auffassung geht er so weit, dass er den Einfluss anderer Umstände gänzlich in Abrede stellt. Demgemäß polemisiert er mit A. Speyer, welcher in seinen „Bemerkungen über den Einfluss des Nahrungswechsels auf morphologische Veränderungen“ (Stett. e. Zeit. 1883) auf den genannten Faktor hinweist, und mit O. Habich, in dessen Arbeit „Ueber den Einfluss des Futters auf die Färbung und Zeichnung der Raupen des Genus *Eupithecia*“ (Stett. e. Zeit. 1894) die Wirkung des frischen und trockenen Futters auf die Raupe erörtert wird. Nach Schröder wird die Farbe der Raupe nur deshalb umgewandelt, weil ja das vertrocknete Futter auch eine andere Farbe annimmt. Dass auch dieses Moment bei Beurteilung des Raupenkleides in Betracht zu ziehen ist, unterliegt keinem Zweifel.

Es darf nicht vergessen werden, dass bei den anderthalb tausend gezeichneten Raupen manche Stücke bei verschiedener Farbe der Behälter in völlig gleicher Weise variierten. Schröder gibt selbst zu, dass eigentlich nur die Verdunklung oder Aufhellung der Raupenhaut bedeutungsvoll ist. So liegt der Gedanke nahe, dass nicht die Farbe, sondern die Intensität der Beleuchtung dasjenige ist, was auf den Organismus umgestaltend wirkt. Dieser Schluss ergibt sich sogar unmittelbar aus Schröder's eigenen, gesperrt gedruckten Worten: Die Erhellung und Verschmälerung der Zeichnung bis zum Verschwinden ganzer Teile derselben, die Annahme phyletisch älterer Zeichnungsformen entspricht völlig den helleren Tönen der Grundfarbe, wie umgekehrt eine Verdunklung und Verbreiterung ihrer Teile und das Auftreten phyletisch jüngerer Zeichnungsformen den dunkleren Tönen derselben.

Im Großen und Ganzen hat Schröder das Verdienst, nachgewiesen zu haben, „dass die Zeichnung, ein biologischer Schutz für ihren Träger, in ihrer Variabilität von der Farbe der Umgebung geleitet wird.“ (Schlussatz).

Formuliert man dieses Endergebnis in der von mir angedeuteten Weise, dann ist es unanfechtbar. Es ist aber auch recht bescheiden.

Wien, Januar 1895.

On the variation and distribution of the smooth snake
(*Coronella austriaca* Laur.) in Sweden.

By Dr. Einar Lönnberg.

As it recently has been stated that the „smooth snake“ of Denmark is *Coluber longissimus* Laurenti or *C. Aesculapii*¹⁾ Lacepede

1) Georg Sarauw, „Haslingen, Åskulapslængen og Grönöglen“, Naturen og Mennesket, Copenhagen 1894, p. 258—274.

(von Linné) and that *Coronella austriaca* as yet has not been proved to be a Danish species of snake, it is of a certain interest to again have certified that the Swedish species of smooth snake really is *Coronella austriaca* Laur. But this is not the only reason why I have written these following short notes. In „the Zoologist“ of January 1894 the eminent herpetologist Boulenger published an interesting paper¹⁾ „on the variations of the smooth snake“ and this ronsed me to make a comparison of the material of this species kept in the Zoological Museum of the R. University of Upsala. Having made this comparison I have the opportunity to add a little to the knowledge of this highly varying form and to show that its variability here in Sweden, at the northern limit of its geographical range, is as great as anywhere else, where it is found.

The largest specimen in our collection in Upsala measures about 75 cm, and the smooth snake in Sweden rarely exceeds that length. This specimen however seems to have lost about one em and a half of the tip of its tail.

The number of ventral and caudal shields is varying and the largest specimens have not always the greatest number of shields, as may be seen from the following table.

Spec. Nr. 1 from Upland		length 68 em, ventr.sh. 169, caud.sh. 56		
" " 2	" "	" 38 "	" 166,	" 64
" " 3	" "	" 55 "	" 172,	" 57
" " 4	" Östergötland	" 55 "	" 180,	" 36 (not complete)
" " 5	" "	" 61 "	" 172,	" 51
" " 6	" Gotland	" 47 "	" 169,	" 54
" " 7	locality not known	" 53 "	" 172,	" 55
" " 8	from Vestergötland	" 75 "	" 170,	" not complete.

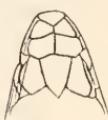
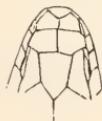
Thus the average number of ventral shields in these eight swedish specimens is 171,2 and the average number of pairs of subcaudal shields is 56,4²⁾. If we compare this result with Boulenger's in his above mentioned paper, we shall find that the average number of ventral shields is smaller in his seven english specimens than in ours as it is 165,7. The average number of pairs of subcaudal shields is however about the same in Boulenger's english specimens namely 55,5. The anal shield is always divided and sometimes as in specimen 4 even the shield preceding the anal shield is divided. But there are also other anomalies to be found with regard to the shields. For instance in specimen 2 the 3 foremost ventral shields are divided. The

1) l. c. p. 10—15.

2) I have not counted the number of subcaudals in the mutilated specimen, but instead the caudals of another specimen without head in which they are 58.

known limits of variation in number of ventral shields are 153—199 and of subcaudal shields 42—70 and thus the swedish specimens are intermediate forms in this respect.

The shape of the plates of the head is varying as well, and above all, the rostral has a different shape in different specimens. As Boulenger has stated, the var. *fitzingeri* is not only confined to Italy, but is found later in Portugal, Spain and Austria, and even in England. In Nr. 1, 3, 5 and 7 of the above mentioned specimens the upper portion of the rostral measures fully two thirds or more of its distance from the frontal. Thus these specimens come within the limits of the mentioned variety which at the same time gets reduced to merely an individual variety instead of its former rank as a geographical one. In the other specimens the upper portion of the rostral measures from one third to one half of its distance from the frontal. According to Boulenger on his specimens the character from the rostral is completely deprived of any correlative of any other, either in the lepidosis or in the coloration, and this is the case with the Upsala specimens too. The shape of the frontal is different as well, sometimes nearly triangular with the base forwards sometimes hexangular with anterior angle. Other plates are normal in number and shape in all 8 specimens.



Three figures showing different stages of development of the rostral plate in swedish specimens of the smooth snake.

The coloration is different however in different specimens. Six¹⁾ specimens are grayish brown with a double row of dark spots on the back, and a row of smaller similar spots on each side. Sometimes there is a lighter stripe on the back between both rows of spots. Often there is a dark stripe on each side of the head from nostril through eye, extending on the sides of the neck corresponding to the lateral row of spots. In specimen Nr. 8 this is obsolete and the lateral row of spots is reduced to a the faint dusky line. On the posterior part of the head there is a large blackish brown blotch corresponding to both dorsal rows of spots but not confluent with them. Forehead mottled with darker. Belly blackish, in the middle mottled with darker, towards the sides speckled with white and black. Four specimens are more distinctly brown, partly coppery. The lateral spots can not

1) For the comparison of the colour of different individuals I have two more mutilated specimens thus 10 in all.

be seen but as a dusky stripe on one of these specimens. The stripe on the sides of the head is quite clear in two specimens but is lacking in the other two. The dorsal spots are more conspicuous on the anterior part of the body in the four brown specimens, less so on the posterior. The dark blotch on the occiput is not much visible as such, but the coloration of the upper surfacee of the head is a little darker than that of the back. The belly is lighter than in the grayish specimens, anteriorly yellowish, less speckled, posteriorly more speckled with dark and white, partly cloudy, partly in tiny but distinct spots. One of these specimens is bright coppery towards the belly; and also has the lateral parts of the gastrosteges speckled with coppery and brick red. The palest specimen is that from Gotland; it is nearly fawncoloured with a faint tint of brickred towards the belly. On the apex of nearly every scale of all specimens there is one or usually two well defined very small blackish spots.

The smooth snake is in Sweden found in nearly all provinces of the southern part, from Blekinge to Upland and Bohuslän. Thus it can be said that the smooth snake has about the same distribution in Sweden as the oaktree (*Quercus robur*). In Norway the smooth snake is mainly found round the fjord of Christiania, and along the south-coast, at Arendal, Chistiansand, Ekersund and Stavanger, but seldom in the interior of the country¹⁾. The oak-flora also extends further north along the coast, which shows the connection of the smooth snake with the oak-flora. It thus seems quite natural that the smooth snake has entered the Scandinavian peninsula from the south at the same time as the oak-flora, and the with the same connected and upon it more or less depending fauna. It then entered on the broad land-bridge that in the first part of the postglacial time existed between South-Sweden and Germany by way of Denmark and the danish islands. The smooth snake is not found fossil in Sweden as in Denmark, but it has probably been contemporary with the following: *Cervus elaphus*, *C. capreolus*, *Bos bison*, *Felis catus*, *Meles taxus*, *Erinaceus europaeus*, *Talpa europaea*, *Myoxus avellanarius*, *Mustela putorius* and others.

Some of these animals have long been extinct in Sweden (*Bos bison*, *Felis catus*) or at least confined to the most southern part of the country as *Cervus elaphus*. The others have about the same distribution in Sweden as the oak, and the smooth snake, or possibly do they not reach fully so far north. Usually the river of Dalarne is regarded as the northern limit of the oak, but some individuals are scattered further north, in Gestrikland in suitable localities near the

1) That it has been found once or twice in the mountians of Dovre as high up as in the birchregion must be regarded as something accidental and anomalous.

rivers¹⁾), which to a certain degree temper the climate. The *Erinaceus* extends just as far north, as it is still found in southern Gestrikland but not further. The *Talpa* is recorded from Södermanland, south of the Mälar-lake and Nerike. The *Myoxus* has been found in Nerike of central Sweden and on Kolmården between Oestergötland and Södermanland. The *Meles taxus* is found as far north as Jemtland but it is common only in the oak-region, and its distribution has a certain connection with the same.

Among the birds it is of course more difficult to point out those which represent the oak-fauna. The most characteristic bird of the swedish oakregion is *Sitta europaea*. Probably *Parus coeruleus* is to be regarded as belonging to the oak-fauna, as well, and possibly *Phyllopterus sibilatrix*. More uncertain is, whether *Picus viridis* and *Coracias garrula* can be counted among the oakbirds. *Lacerta agilis* is found in South Sweden and does not extend so far north as the oak, but it is however probably a member of the oakfauna and this is possible with some of the batrachians as *Hyla* and others which only are found in Scania.

Ueber die Protozoen als Krankheitserreger und ihre Bedeutung für die Entstehung der Geschwülste.

Von Prof. Dr. G. Hauser.

Wie die Bakterien im Pflanzenreich die niederste Stufe einnehmen, so stellen bekanntlich die Protozoen die niedersten und einfachsten Formen des Tierreiches dar; gleich den Bakterien sind auch sie kleinste einzellige Wesen, ohne zellig gesonderte Organanlage, welche sich ebenfalls meistens durch einfache Teilung, auf ungeschlechtlichem Wege fortpflanzen.

Die Stellung dieser niedersten Lebewesen war lange Zeit eine unsichere; während die bereits gegen Ende des 17. Jahrhunderts von Leeuwenhoek entdeckten Bakterien wegen ihrer Eigenbewegung bis in die 50 Jahre dieses Jahrhunderts für kleinste Tierchen gehalten und erst von Perty und Cohn mit Sicherheit als pflanzliche Gebilde erkannt wurden, sehen wir anderseits, dass die Tiernatur der für die Pathologie wahrscheinlich bedeutungsvollsten Gruppe der Protozoen, der Sporozoen, noch bis in die neuere Zeit manchen Autoren zweifelhaft erschien.

1) The most northern locality where I have found wild-growing oaktrees is at „Sju forsarne“ („seven falls“) of the Testebo-river near Ockelbo in Gestrikland. But planted the oak does well, even a good deal further north, as at Kilafors in Helsingland where quite large oaktrees can be seen on the yard at the old ironwork.

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