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Trzecia notatka o *Planaria alpina* i *Planaria gonocephala* w okolicach Ojcowa.

Third note on *Planaria alpina* and *Planaria gonocephala* in the vicinity of Ojców.

In 1926 I investigated once more the Planarian fauna of the Sąsówka river, at Ojców, near Kraków, and at the same time extended my investigations begun in 1914 in the region of the upper reaches of the Prądnik river.

On two previous occasions I have dealt with the Planarian fauna of the Sąsówka; the results of these investigations were published in two papers, viz.: „Wypławki *Planaria alpina* Dana i *Planaria gonocephala* Dugès w Ojcowie“ (Sprawozdania Towarz. Nauk. Warsz. VII, 1916, Warszawa), and „Kilka nowych stanowisk wypławków krynicznych“ (Kosmos, 46, 1923, Lwów), the latter paper dealt with interesting changes noticed in the springs in spring of 1921.

In 1926 I visited again the springs of the Sąsówka valley previously described. In the present report I quote in brackets the pages of my first paper on the subject, which contain a description of the different springs in question; the first figure given refers to the Polish text, whilst the second to the French one.

While in 1914 I was not able to find any Planariae in the concrete-walled spring in the village of Sąsów (pages 628 and 637), this time I found there a small number of *Planaria gonocephala* Dugès. The temperature of the water was 10,25° C on Sept. 6 th., 1926.

Of two small springs situated somewhat lower (pages 628, 633 and 637, 641), one had entirely disappeared. In the other

both species were found again, not only in its subterranean portion, but also in the part of the spring above the ground. *Planaria alpina* Dana occurred in fairly large numbers, whilst only a few, well-grown specimens of *Pl. gonocephala* were found. These two species thus continue to co-exist in this spring.

Not very numerous specimens of *Pl. alpina* were found again in the rivulet constituting the right-hand tributary of the Sąspówka within the confines of the village of Sąspów. One individual found was of fairly large dimensions. The temperature of the water varied from 10° to 11° C depending on the place.

Of the second group of springs, situated at the mouth of the „Jamki“ valley, the greatest changes have taken place in two interesting springs, which in 1914 were at a distance of a metre apart. One of them contained in 1914 exclusively *Pl. alpina*, and the other chiefly *Pl. gonocephala*, with a few individuals of *Pl. alpina* (pages 631 and 640). In 1926 the establishment of a local road, passing immediately above both springs, led to their being filled in partly, and their position changed in such a way, that they have now practically completely been fused into a single spring, the water of which shows a temperature of 9,5° C. To-day it is, in spite of its fairly rapid current, practically entirely overgrown with vegetation; *Pl. alpina* and *Pl. gonocephala* are present in nearly equal quantities. In the upper part of the stream flowing from the spring, which is about 23 m long, both species are found, whilst in the lower portion up to the point where it joins the Sąspówka, Planariae are, very few in number, owing to the rapid current and to the absence of stones. I found merely a few *Pl. gonocephala* individuals.

In the old trout pond (pages 630 and 639), the temperature of which was 9,5°, I found again numerous *Pl. alpina*. In the outflow of this pond, which was 30—40 m long the same species was present in its upper portions, whilst in the lower part, up to where it enters the Sąspówka, both species were found.

Somewhat below this pond, also on the left bank of the Sąspówka, a small spring (1×1 m, depth 30 cm), not mentioned in my previous papers, is situated. This is a typical limno-crene spring, with overgrown edges; a stream 10—20 m long flows out from it. The temperature of the spring is 9,5° C, i. e. identical with that of the trout pond, yet both in the spring and

in the stream issuing from it exclusively *Pl. gonocephala* was found.

The spring in the meadows mentioned in my previous paper (pages 630 and 639), which was then entirely overgrown and concealed by vegetation, has since been considerably deepened; as before, exclusively *Pl. alpina* was found in it. Its outflow is, as in 1914, completely overgrown with aquatic and marsh plants. Close to this spring is a strong rheocrene (2×2 m) not mentioned previously; this rheocrene, temperature 9,5° C, contains only *Pl. alpina*.

Thus, on the whole, only insignificant changes have taken place since 1914. The state of the Planarian fauna is, however, very interesting if we compare it with that encountered in the same springs in spring of 1921, at which time Planariae were either entirely absent or present only in very small numbers in these places. I ascribed then this circumstance to their having been swept away by the recent spring floods of the Sąspówka, which, as I was able to conclude from numerous traces left, inundates the entire valley, so that all the springs were flooded. From the fact that the number of Planariae found in autumn of 1926 was not different from that found in 1914, it may be deduced that this annual flushing out of the Planariae must be compensated by the multiplication of these animals in some places protected from the action of floods, such as, for instance, subterranean waters, whence they emerge gradually afterwards to the surface, to the springs and to the streams, where they remain until the floods come again.

In 1926 I made a detailed examination of the Prądnik valley, with which I had not been able to get acquainted in 1914, owing to the outbreak of the war.

The Prądnik contains, over a distance of 7 kilometres, between Ojców and Pieskowa Skała, similarly as the Sąspówka, only *Planaria gonocephala*, and it is of interest that the springs, over this entire distance, contain also only this species. This was found to be the case in a strong rheocrene spring (1×1 m, depth 20 cm), situated above Grodzisk, of a temperature of 9°C, next, in an equally rapidly flowing rheocrene, temperature 10,5° C, situated somewhat higher, about 2 km from Pieskowa Skała, and in the rheocrene spring at Pieskowa Skała, above the castle; the

temperature of the water of this spring was 9,5° C, and the spring (1 × 1 m) has a sandy bottom and is free of vegetation. In the above springs, in spite of the fact that the temperature of some of them was sufficiently low to favour the development of *Pl. alpina*, this last species is completely absent.

Planaria alpina is again encountered within the limits of the Sułoszowa village. Here practically all of the very numerous springs contain this species, in spite of the fact that certain of them contain water of a relatively high temperature. Altogether I found 39 springs in the confines of this village, the temperature of which varied about 9,5° C, although a few of them had a much higher temperature.

Occasionally quite unexpected conditions are encountered in these springs. Thus, as one proceeds from Pieskowa Skała up the Prądnik, the first spring encountered on entering the Sułoszowa village is a strong rheocrene (temperature 9,5° C on Sept. 7th, 1926), situated close to the river and possessing a stony bottom. This rheocrene, as well as the stream flowing from it, contains numerous *Pl. gonocephala*, amongst which only one small specimen of *Pl. alpina* was found. A little further up the river is a large limnocrene spring, the bottom of which consist of mud, without stones; the temperature was found to be 13° C; this contains in spite of its high temperature only *Pl. alpina* in large numbers, and of various size. This limnocrene is situated immediately above the river, which, both at this point and below it, contains only *Pl. gonocephala*. A few steps further up the river was found a small rheocrene, temperature 9,5° C, with an outflow not more than 10 m long; in both the rheocrene and its outflow I found, as was to be expected, only *Pl. alpina*.

At this point exclusively *Pl. gonocephala* continues to be found in the Prądnik, on both banks of which we meet with numerous springs containing *Pl. alpina*, in spite of the fact that the temperature of certain of them is as high as 13°, 12,5° or 10,5° C respectively, the average temperature of these springs varying, however, from 9° to 10° C.

Approximately half-way through the village *Pl. alpina* begins to appear in the Prądnik river itself; it is at first found together with *Pl. gonocephala*, which, however, soon disappears altogether, leaving the stream exclusively to the former species.

The temperature of the stream is here about 10,33° C. All the springs adjacent to this section of the stream contain exclusively *Pl. alpina*, with the exception of a few in which, for some unexplained reason, no Planariae at all were to be found.

Towards the upper end of Sułoszowa village, in the vicinity of the two bridges, by the church, I found 19 rheocene springs over a distance of 40—50 m; in these, as also in the Prądnik itself at that place, only *Pl. alpina* was found in large numbers.

Above the bridges the Prądnik narrows, springs are no longer to be found, and the houses of the village, which up to this point are fairly widely separated from one another, and are not situated very close to the river, are crowded close to one another on the banks of the stream, the water of which is as a consequence turbid, and the temperature of which rises (absence of cold springs) as high as 16°C on Sept. 7th, 1926. Higher up the stream, past the village, it flows through meadows for about 1 kilometre, as a narrow, rapid torrent, and over this section not a single Planaria was found.

The source of the Prądnik consist of 3 limnocene springs, deformed by human activity, and partly filled in. The temperature of these springs was:

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|-----|---------|
| I | 8,5° C. |
| II | 9,0° „ |
| III | 11,5° „ |

Planariae were absent from all 3 springs.

The conditions found in the Prądnik appear to indicate that not only the temperature of a given spring determines the species of Planaria which can be found in it, but that in all probability, apart from a number of other factors, the bottom of the spring may also be a factor of importance. A stony bottom, particularly one containing loosely packed large stones, favours the development of *Pl. gonocephala*, whilst, on the contrary, a muddy bottom, free from stones, is more suitable for *Pl. alpina*, favouring this species in its struggle for existence. This factor would, of course, be only one of many factors entering into play, and together forming a very complex whole, often very difficult to comprehend in each individual case.

STRESZCZENIE.

Autor, odwiedziwszy we wrześniu 1926 r. Ojców, opisuje stan wyplawków w źródłach Sąsówki. Stan ten naogół pozostał taki sam, jakim go widział autor w lecie 1914 r., co wskazuje, że zniszczenie fauny źródeł przez powodzie wiosenne, obserwowane przez autora w 1921 roku, zostaje widocznie corocznie powetowane.

Pozatem autor uzupełnia swe obserwacje z 1914 r. zbadaniem rozmieszczenia wyplawków krynicznych w Prądniku, zajęтым do połowy wsi Sułoszowej wyłącznie przez *Pl. gonocephala*, wyżej zaś, aż do dwóch mostów koło kościoła, przez *Pl. alpina*. Źródła w liczbie 39, położone we wsi zajmuje, z pewnymi wyjątkami, przeważnie ten ostatni gatunek. Z faktu, że w niektórych źródłach reokrenowych o niskiej temperaturze występuje wyłącznie, albo przeważnie *Pl. gonocephala*, a odwrotnie w niektórych źródłach limnokrenowych, pomimo wysokiej, dochodzącej do 13° C temperatury, spotykamy wyłącznie lub przeważnie *Pl. alpina*, autor wnioskuje, że na występowanie obu gatunków wywiera wpływ między innymi i charakter podłoża.
