

A C T A   Z O O L O G I C A  
C R A C O V I E N S I A

Tom V

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Jan STACH

**Zagadnienia związane z rodzajem *Spinisotoma* STACH (*Skoczogonki*)**

**Проблема связанная с родом *Spinisotoma* STACH (*Collembola*)**

**The Problem of the Genus *Spinisotoma* STACH (*Collembola*)**

PL. XCIV—XCV

In 1926 I described a new species of the subfamily *Isotominae* SCHÄFF. on the ground of specimens caught by me in Poland (Czarny Dunajec, near Tatra Mts). It was a very interesting as having on the fifth abdominal tergite a transversal row consisting of four rarely six papillae each armed with a spine. I established for it a new genus *Spinisotoma* and named the species *Spinisotoma pectinata* STACH.

Since that I found many species of this species in other localities in Poland (Tatra, Beskides Mts), also in materials from East Carpathians (Czywczyn on river Czeremosz), Ukraina (Dublany near Lwow, Kiev) and Hungary (Börzönyi- and Bakony-Mts.).

A second closely related species *Spinisotoma stachi* described DENIS (1929) from Italy and Spain. The same species, but two months later, I have noted from Slovakia as *Spinisotoma regina* STACH, and BRIAN (1945) described it from England (Cambridge) as *Spinisotoma ehippiata* BRIAN; both these species are identical with *Spinisotoma stachi* DENIS.

The third species *Spinisotoma dimorpha* WOM. was found by WOMERSLEY (1934) in South Australia (Urrbrae), the fourth one *Spinisotoma dispersa* Wray by Wray (1952) in USA and the fifth *I. vaillanti* by MURPHY (1858) in Algier.

Meanwhile AGRELL (1936) has caught many specimens of *Spinisotoma pectinata* STACH in Sweden, determined them, however, as a with spines armed variety of *Isotoma propinqua* AXELS.

However DENIS (1929) noted distinctly in description of *Spinisotoma stachi* DEN. that the individuals of this species being furnished with spines are the males and the unspined specimens are the females, and he gave good figures of them.

The same observed WOMERSLEY (1934) in *Spinisotoma dimorpha* WOM., BRIAN (1945) in *Spinisotoma ephippiata* BRIAN and I (1947) in *Spinisotoma pectinata* STACH.

The genus *Spinisotoma* STACH was then well characterized by the secondary sexual dimorphism, distinguished by the presence of 4—6 spines at the posterior margin of the fifth abdominal tergite in the males of all here belonging species.

Lately CASSAGNAU has undertaken the investigations of influence of the temperature on morphology of the *Collembola*. Within the framework of these investigations the author in 1956 published the results of this observations on *Spinisotoma stachi* DEN. caught by him in France in many specimens together with *Isotoma olivacea* TULLB. in the same populations. By examination of these populations he has observed the arising of the spines in young individuals, but not in all of them and ascertained that among the larger individuals (longer than 1,35 mm length of the body) the spined specimens are wanting. The appearance of the spines in some individuals of *Spinisotoma stachi* DEN. the author attributed to the influence of higher temperature. Since — according to author — the genital aperture may be recognized just in individuals longer than 1,1—1,2 mm, he does not state, if the spines appear in both or only in one sex.

I give here at present the results of my investigations on *Spinisotoma pectinata* STACH. They were undertaken in order to explain if the spines appear in this species actually only in the males, and what a systematic relation is of *Spinisotoma*

*pectinata* STACH to the other representatives of the genus *Iso-*  
*toma* BOURL.

I have examined many specimens of *Spinisotoma pectinata* caught by myself in the same localities and at the same time.

The localities were:

Czarny Dunajec, near Tatra Mts, on a pasture near the river, in a cellar near a peasant-house, and in very moist *Sphagnum* on the border of a forest, all during VII—VIII;

Tatra Mts, under moist wood, from water-full moss-cushions, at 900—1600 m alt. during VI—VIII;

Besides Mts, Krynica, in a small ravine from waterfull moss covering the stones lying in a small brook

10 VII...102 sp. mostly spined, small;

13 VII... 12 spined and 7 unspined spec.;

15 VII... 5 unspined sp.;

17 VII... 2 unspined.

If these populations were consisting of the individuals not longer than 0,6—1 mm a part of these individuals were always armed with spines and such forms were often predominant. If the population were composed of the individuals of various length, but not longer than 1,5 mm, the number of the spined forms becomes smaller. And among the specimens collected in the same localities, but larger, of about 1,7—2 mm length, I have never met any individual furnished with spines.

Many specimens of the spined and unspined individuals of various length of the body I have exactly examined especially on account of the sex of them and ascertained that the spined forms are always only the males. The slides show that in the small 0,6—0,9 mm long spined individuals the genital organ is not yet developed, also the genital area is lacking, and is visible only a small longitudinal line of the future aperture. In the larger individuals of the 1,2—1,4 mm length of the body the genital area is already marked and furnished with some short setulae, but the genital organ is not yet wholly developed. (Pl. XCIV, fig. 1).

These examinations confirm then the right of the previous observations of the authors that the individuals armed with spines are the males; but moreover learn that these individuals are sexually immature forms.



It arises then a problem in what a shape appear the sexually mature males of *Spinisotoma pectinata* Stach.

This problem leads to the question which connexions exist between the spined immature males of *Spinisotoma pectinata* STACH and the spineless individuals which appear in company with them in the same localities, biotops and at the same time.

I have then undertaken to preparation in the first place the small unspined individuals caught together with those furnished with spines. All these unspined specimens were females, but also immatures, in which the aperture of genital organ was in form of a fine, short, transversal line. Still the larger spineless individuals of 1,6 mm appear as immature females (Pl. XCV, fig. 3).

All the still larger individuals caught by me in the same localities were already spineless and between them were males and females. But belong these specimens to the species *Spinisotoma pectinata* STACH or represent an other species?

AGRELL (1936), as remarked above, has supposed that *Spinisotoma pectinata* STACH is identical with *Isotoma propinqua* AXELS. and the spined individuals belong to variety *Isotoma propinqua* var. *pectinata*. But judging from my observations in appearing of *Spinisotoma pectinata* STACH in nature, at least in Poland, it may be considered only as a synonym of *Isotoma fennica* (REUTER, 1895) and not of *Isotoma propinqua* AXELS.

According to observations of (AXELSON) LINNANIEMI on *Isotoma fennica* (REUT.) and *Isotoma propinqua* AXELS. the differences between these species in characteristics of the body are insignificant, namely only in a little greater length of furcula, postantennal organ and the body in *Isotoma propinqua* AXELS., but very distinct in their appearance in nature. *Isotoma fennica* (REUT.) is — according to LINNANIEMI — a winter animal, which in Finland appears only on snow and *Isotoma propinqua* AXELS. lives in humus-soil near the human settlements.

In Poland I have met *Isotoma fennica* (REUT.) only in mountains, abundantly in Tatra Mts and East Carpathians, where it appears in winter on snow and the brooks not wholly



covered by ice, in company with the cold-loving *Collem-bola Agrenia bidenticulata* (TULLB.), *Hydroisotoma schäfferi* (KRAUSB.) and the true winter-species *Isotoma hiemalis* SCHÖTT. In summer it lives in the water-full moss usually in the immediate nearness of cold water. In my opinion *Isotoma fennica* (REUT.) is a boreo-alpine animal, which in higher North occurs in the mountains (Sarek Mts in Swedish-Lappland) and in winter also in low-land, yet in Central Europe in mountains only.

I defined also *Spinisotoma pectinata* STACH as a cold-loving animal living usually in water-full moss growing on stones lying in water of small mountainous brooks and lakes in Tatra Mts, Beskides and East Carpathians.

As the species *Isotoma propinqua* AXELS. is not known from Poland, and *Isotoma fennica* (Reut.) lives in the same localities and biotops as *Spinisotoma pectinata* STACH, so may supposed that the last species are nearer related. This relationship exists probably and consists on a change of the morphology of *Isotoma fennica* (REUT.) in a stage of its postembryonal growth. Namely, in an early postembryonal stage appear by all its males on fifth abdominal tergite a row of 4—6 spines, the form „*pectinata*“. These spines disappear, however, in the larger males (of 1,3—1,5 mm length), at beginning of the sexual maturity of them. The females remain from beginning unspined.

It arises then only a systematical question.

May be the group of species of the genus *Isotoma* BOURL. in which in a stage of their growth appears a distinct sexual secondary dimorphism — namely, that all the males of this group are armed with spines — considered as a different genus or subgenus (*Spinisotoma* STACH). At all events they represent a distinct group in the genus *Isotoma* BOURL.

We have already in the family *Isotomidae* such group, separated as different genera on the basis of a secondary sexual dimorphism, e. g. *Rhodanella* SALMON, in which the male has thick antennae and strong spines laterally on the head; or *Hydroisotoma* STACH in which the female has six spines on anal valves, wanting in the males.

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## STRESZCZENIE

Autor poddał szczegółowemu badaniu okazy różnej wielkości, młodociane i dojrzałe *Spinisotoma pectinata* STACH i *Isotoma fennica* (REUT.), gatunków skoczogonek (*Collembola*), występujących w faunie Polski. Badania te wykazały, że kolce znamienne dla *Spinisotoma pectinata* STACH pojawiają się

tylko u młodych, płciowo niedojrzałych samców w okresie ich wzrostu od 0,5—1,4 mm. Samce płciowo dojrzałe nie posiadają kolców, a u samic kolce nie pojawiają się w ogóle. Dorosłe osobniki *Spinisotoma pectinata* STACH nie różnią się od określanych jako *Isotoma fennica* (REUT.). Jest tu więc przykład wtórnego dymorfizmu występującego czasowo u osobników męskich, płciowo jeszcze niedojrzałych. Ponieważ u innych gatunków należących do rodzaju *Isotoma* BOURL. taki dymorfizm nie występuje, wylania się pytanie, czy można grupę gatunków, która wyróżnia się tym, że ich samce za młodu mają stale kolce — a mianowicie *Isotoma fennica* (REUT.), *Isotoma olivacea* AXELS., *Isotoma dimorpha* WOM., *Isotoma dispersa* WRAY, oznaczanych dotychczas jako rodzaj *Spinisotoma* STACH — utrzymać nadal w rodzaju *Spinisotoma* STACH, czy też uznać tę grupę za tworzącą podrodzaj *Spinisotoma*. W każdym razie jest to grupa wyróżniająca się tą cechą od innych gatunków rodzaju *Isotoma* BOURL.

## РЕЗЮМЕ

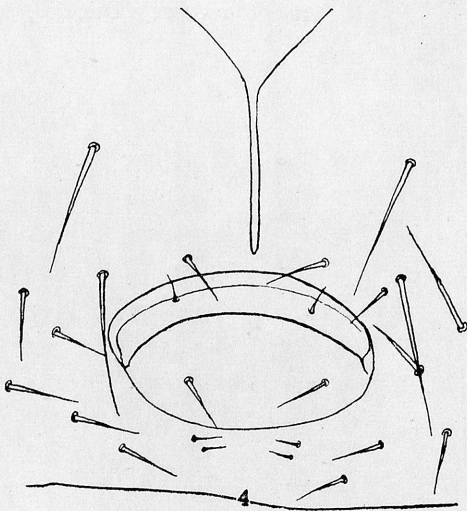
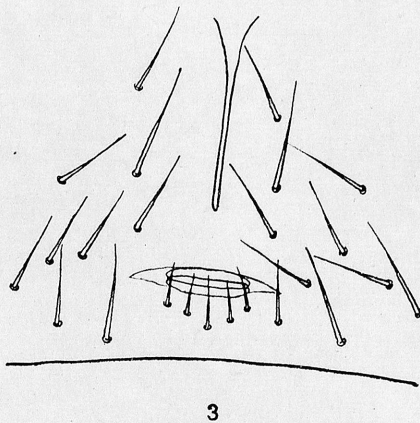
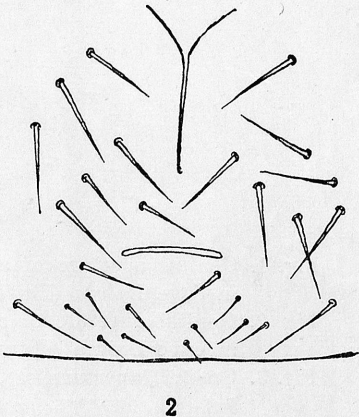
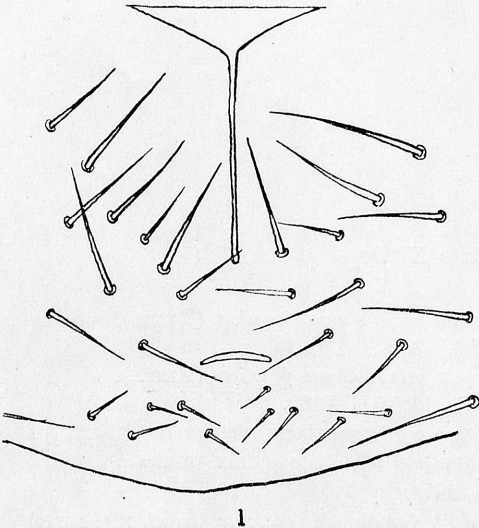
Автор подвергнул тщательному изучению образцы разных величин молодых и зрелых *Spinisotoma pectinata* STACH и *Isotoma fennica* (REUT.), видов *Collembola*, выступающих в фауне Польши. Эти исследования доказали, что типы характерные для *Spinisotoma pectinata* STACH появляются только у молодых, половоз- незрелых самцов во время их возраста от 0,5—1,4 мм. У самцов половоз- зрелых нет шипов, а у самок шипы не появляются вовсе.

Взрослые особи *Spinisotoma pectinata* STACH не отличаются от определяемых как *Isotoma fennica* (REUT.). Это пример вторичного диморфизма выступающего временно у особи мужских, половоз- еще незрелых. Так как у других видов принадлежащих к виду *Isotoma* BOURL. такой диморфизм не выступает, возникает вопрос, можно ли группу видов, которая отличается тем, что у самцов в молодости всегда выступают шипы — а именно *Isotoma fennica* (REUT.), *Isotoma olivacea* AXELS., *Isotoma dimorpha* WOM., *Isotoma dispersa* WRAY, определяемых до настоящего времени как вид *Spinisotoma* STACH — удерживать впредь как вид *Spinisotoma* STACH, или же признать эту группу за производящую подвид *Spinisotoma* или название это вычеркнуть.



## Plate XCIV

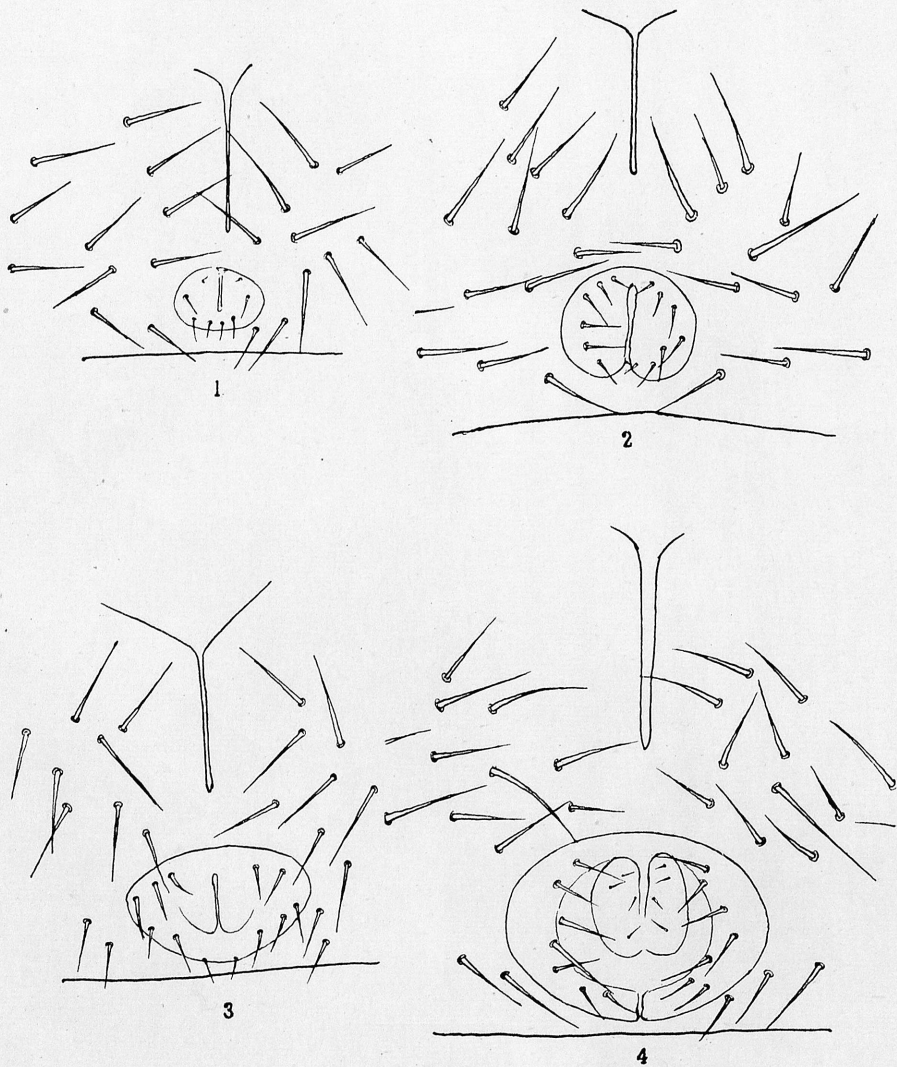
- Fig. 1. Genital area of a male of *Spinisotoma pectinata* STACH, of 1,25 mm length, caught in Tatra Mts (Chłabówki), 13 VIII 1918.
- Fig. 2. Genital area of a male of *Isotoma fennica* (REUT.), caught in cave Dziura (Tatra Mts), 15 VII 1909.
- Fig. 3. Genital area of an other male of *Isotoma fennica* (REUT.), caught in cave Dziura (Tatra Mts), 16 VIII 1932.
- Fig. 4. Genital area of a male of *Isotoma fennica* (REUT.), caught on Pysznapass in Tatra Mts, 23 VII 1932.



## Plate XCV

- Fig. 1. Genital aperture of a female of *Isotoma fennica* (REUT.), caught in cave Dziura (Tatra Mts), 15 VII 1909.
- Fig. 2. Genital aperture of a female of *Isotoma fennica* (REUT.), caught in cave Dziura (Tatra Mts), 16 VIII 1932.
- Fig. 3. Genital aperture of a female *Spinisotoma pectinata* STACH, of 1,8 mm length, caught together with the spined males in Tatra Mts (Chlabówki), 13 VIII 1918.
- Fig. 4. Genital aperture of an adult female of *Isotoma fennica* (REUT.) caught in Czarny Dunajec, 5 VIII 1921.





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