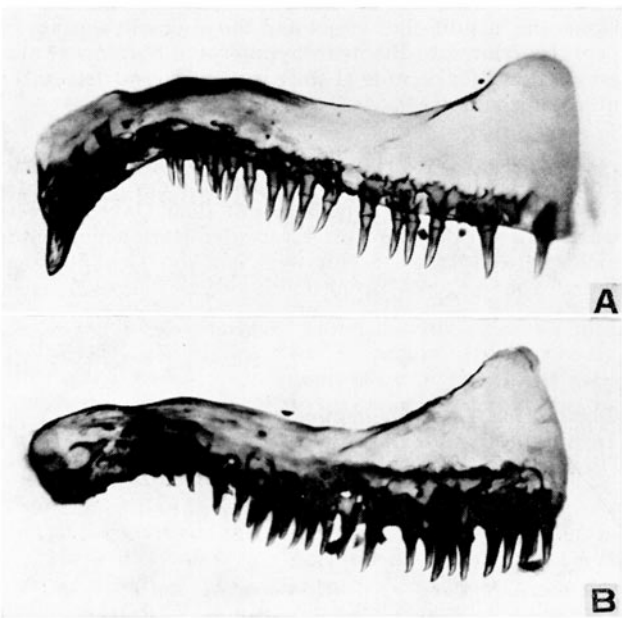
Large distal tooth formation in male medaka

Group	Diet	No.	Total body length (mm)		Anal fin type			No. of large teeth			
					♂	♀	⚥	Maxillae		Mandible	
			Mean	(Range)				Mean	(Range)	Mean	(Range)
(1)	Standard diet	10	26.9	(25–29)	10	0	0	2.3	(2–4)	1.7	(0–4)
(2)	10 μg estradiol/g standard diet	10	26.8	(25–28)	5	3	2	1.2	(0–3)	1.3	(0–4)
(3)	50 μg estradiol/g standard diet	10	25.8	(25–27)	0	10	0	0	(0)	0	(0)



Teeth on right maxillary bone of 25 mm male medaka fed with standard diet (A) and 50 μg of estradiol/g of standard diet (B). Large distal tooth is seen at left end of the bone in (A).

ment, 50 μg of estradiol/g of diet was necessary to suppress the manifestation of male sex characteristics. This may be interpreted as an antagonism between exogenous estrogen and endogenous male sex hormone liberated from the testis.

In the normal male medaka, large teeth begin to develop when total body length is about 20 mm, erupt from oral epithelium at 22 mm and formation is complete at 23 mm. Body length of the medakas was 15–17 mm at the beginning of the experiment, a stage well in advance of the development of large teeth.

Estradiol had no effect on the shape of the small teeth on the main part of the maxillae as shown in the Figure[6].

Zusammenfassung. Junge Männchen von *Oryzias latipes* haben im Ober- und Unterkiefer grosse Eckzähne, die den weiblichen Tieren fehlen. Verfütterung von 50 μg Östradiol/g Normalfutter hemmt die Bildung dieser Zähne völlig, 10 μg nur unvollständig.

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Chromosome Numbers in Five Species of Pentatomidae Reut (Hemiptera - Heteroptera)

The family status of the Plataspidae, Acanthosomatidae, Cydnidae and Scutelleridae have been recognized by SOUTHWOOD and LESTON, and also KERZNER and JACZEWSKI[1]. However, following KIRKALDY[2], several authors, such as STICHEL and WAGNER[3], put the last-mentioned family in the Scutellerinae of the Pentatomidae. Based on cytological findings all these families are characterized by having 12 chromosomes with the usual $XX{:}XY$ determination and caryotype comparable with that of the pentatomid bugs. Their chromosome number is distinct from the pentatomid type which may be characterized by the presence of 14 chromosomes.

The present paper deals with the chromosomes of some Pentatomoidea, excluding the Pentatomidae.

Materials and methods. The materials used were as follows: Plataspidae: *Coptosoma scutellatum* Geoffr., Acanthosomatidae: *Elasmucha grisea* L., Cydnidae: *Legnotus picipes* Fall., Scutelleridae: *Phimodera lapponica* Zett. and *Eurygaster testudinaria* Geoffr. They were collected in Lublin and Olsztyn provinces.

Aceto-orcein testes squashes were made and figures have been drawn with the aid of camera lucida. × 2400.

Observations. (1) *Coptosoma scutellatum* Geoffr. This species, like some others belonging to Plataspidae[4], has 12 chromosomes. In the spermatogonial metaphase (Figure 1), 2 *M*-chromosomes could be distinguished from the remaining ones. They are distinctly larger than the 8, nearly of the same size, autosomes and the *X* and *Y* com-

[1] T. R. E. SOUTHWOOD and D. LESTON, *Land and Water Bugs of the British Isles* (F. Warne and Co. Ltd., London and New York 1959). – I. M. KERZNER and T. L. JACZEWSKI, in *A Key to the Insects of European Part of Soviet Union* (Nauka Press, Moskow, Leningrad 1964), vol. 1.

[2] G. W. KIRKALDY, *Catalogue of the Hemiptera (Heteroptera)* (F. L. Dames, Berlin 1909), vol. 1.

[3] W. STICHEL, *Illustrierte Bestimmungstabellen der Wanzen. II Europa* (Hermsdorf, Berlin 1955–1962). – E. WAGNER, in *Die Tierwelt Mitteleuropas* (Quelle Meyer, Leipzig 1961), vol. 4.

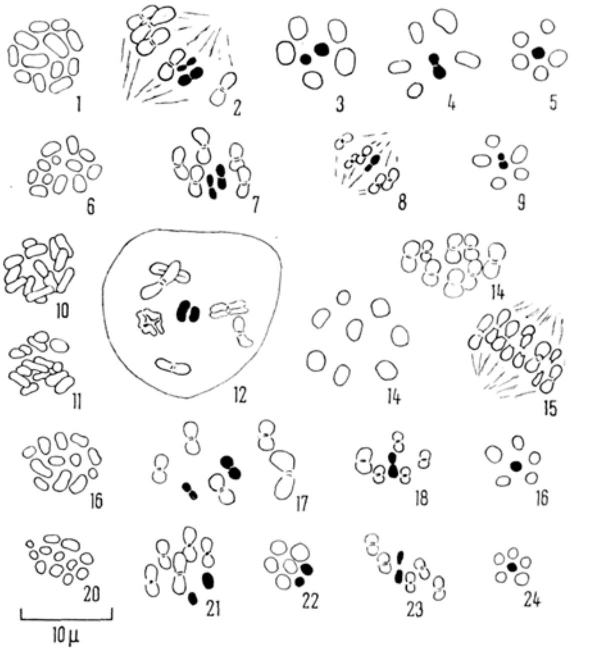
[4] S. MAKINO, *An Atlas of the Chromosome Number in Animals* (Iowa State College Press, Ames 1951). – G. K. MANNA, Proc. Int. Congr. Ent. *2*, 919 (1958).

plements. In the first meiotic division, the sex-chromosomes lie near each other (Figures 2 and 3); in the second division, however, they form a pseudo-bivalent (Figures 4 and 5). In both cases, they occupy a central position in the metaphase plates.

(2) *Elasmucha grisea* L. The diploid number of chromosomes is 12 in the spermatogonial metaphase plates (Figure 6). The metaphase I shows 5 autosomal bivalents ($1\,M + 4\,A$) and the X and Y chromosomes (Figure 7). However, the plates of the second maturation division contain 5 autosomal univalents and the XY complex (Figures 8 and 9).

There are cytological data of some species of Acanthosoma Curt. and Elasmostethus Fieb.[5]. They all have 12 chromosomes.

(3) *Legnotus picipes* Fall. The diploid complement shows 14 chromosomes in the spermatogonial metaphase (Figures 10 and 11). In the late prophase I, 2 heteropycnotic sex-plasm bodies lie in the cell centre surrounded by the autosomal bivalents (Figure 12). In the first metaphase stage, the chromosomal elements are nearly of the same size, with the exception of a smaller one which is presumably the Y (Figures 13 and 14). It was impossible to identify the X-chromosome in this stage. In the early anaphase I, when the chromosomal elements begin to move away from each other towards the opposite poles of the karyokinetic spindle, it was also impossible (Figure 15). Unfortunately I could not observe the second division stages of the spermatocytes in which the sex-chromosomes in a process of association form a centrally placed pseudo-bivalent. According to the Figure 12, the X-chromosome is probably equal in size to the autosomes.



Figs. 1–5. *Coptosoma scutellatum* Geoffr. (1) Spermatogonial metaphase. (2) Metaphase I (side view). (3) Metaphase I (polar view). (4) and (5) Metaphase II (sex-chromosomes shown in black). Figs. 6–9. *Elasmucha grisea* L. (6) Spermatogonial metaphase. (7) Metaphase I. (8) and (9) Metaphase II. Figs. 10–15. *Legnotus picipes* Fall. (10) and (11) Spermatogonial metaphase. (12) Late prophase I. (13) and (14) Metaphase I. (15) Early anaphase I. Figs. 16–19. *Phimodera lapponica* Zett. (16) Spermatogonial metaphase. (17) Metaphase I. (18) and (19) Metaphase II. Figs. 20–24. *Eurygaster testudinaria* Geoffr. (20) Spermatogonial metaphase. (21) and (22) Metaphase I. (23) and (24) Metaphase II.

Cytologically, other species are known belonging to the family Cydnidae: *Sehirus bicolor* L., *Macroscytus subaeneus* Dall. and *Stibaropus molginus* Schdte. After Manna and Southwood and Leston, the first 2 have 12 while the third 31 chromosomes and X_1X_2Y sex-determination[6].

(4) *Phimodera lapponica* Zett. This species is in the essential configuration of the chromosome complement very similar to these described above in *Coptosoma scutellatum* Geoffr. and *Elasmucha grisea* L. or below in *Eurygaster testudinaria* Geoffr. The diploid chromosome complement in the spermatogonial metaphase is 10 autosomes and X and Y chromosomes (Figure 16). The autosomal bivalents in the first (Figure 17) as well as the autosomal univalents in the second maturation division (Figures 18 and 19) are characterized by one large M-chromosome and 4 smaller A-chromosomes equal in size. In size, one of the sex-chromosomes is close to an A-chromosome, while the other one is only half the size.

(5) *Eurygaster testudinaria* Geoffr. The chromosome complement is the same in number and general size relations as in the species of Eurygaster Lap. already described by Schachow and da Cunha[7]. The spermatogonial metaphase plates carry 12 chromosomes (Figure 20). At the first spermatocyte metaphase (Figures 21 and 22) the X and Y usually take a peripheral position in the chromosomal arrangement surrounding one of the bivalent autosomes. As the second spermatocyte metaphase is formed, however, the sex-chromosome complex lies in the middle of a ring formed by the autosomes (Figures 23 and 24) and passes to the opposite poles in the anaphase with autosome halves.

Conclusion. Excluding *Legnotus picipes* Fall., which is characterized by the presence of 14 chromosomes, all the species examined possess 12 chromosomes in their diploid complement. The 5 pairs of autosomes are composed of one large pair and 4 smaller ones. In the first spermatocyte metaphase plates, the X and Y take a central or a peripheral (*Eurygaster testudinaria* Geoffr.) position in the chromosomal arrangement. In the second spermatocyte metaphase, however, they always lie in the centre of a ring formed by the autosomes[8].

Zusammenfassung. Die 5 Schildwanzenarten *Coptosoma scutellatum* Geoffr., *Elasmucha grisea* L., *Legnotus picipes* Fall., *Phimodera lapponica* Zett. und *Eurygaster testudinaria* Geoffr. wurden während der Spermatogenese karyologisch geprüft. Mit Ausnahme von *Legnotus picipes* Fall. wurde die diploide Chromosomenzahl mit $2M + 8A + X + Y$ bestimmt.

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[5] S. Makino, *An Atlas of the Chromosome Number in Animals* (Iowa State College Press, Ames 1951). – T. R. E. Southwood and D. Leston, *Land and Water Bugs of the British Isles* (F. Warne and Co. Ltd., London and New York 1959).

[6] G. K. Manna, Proc. Int. Congr. Ent. *2*, 919 (1958). – T. R. E. Southwood and D. Leston, *Land and Water Bugs of the British Isles* (F. Warne and Co. Ltd., London and New York 1959).

[7] S. D. Schachow, Anat. Anz. *75*, 1 (1932). – A. X. da Cunha, Mems Estud. Mus. Zool. Univ. Coimbra, No. *163* (1945).

[8] Acknowledgment. I am greatly indebted to Dr. A. Cmoluch for her kindness in making available the specimen *Phimodera lapponica* Zett. to a purpose of cytological examination.