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STICKLE-BACKS OF JAPAN.

BY

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The materials at hand are represented from Sapporo and its vicinity in the island of Hokkaido, from Gifu, Mino Province, and Tamagawa near Tokyo. Of these specimens the variations of a species in its form, lateral armature, and colouration in the case of *Gasterosteus cataphractus*, are considered to be due to the differences of seasons and changes of environment. Now that it is impossible, after careful examination, to satisfactorily separate the varied examples in the lateral armature, which is in some fully, in some, partly mailed, this family of Japan falls into two genera and four species with a new one.

A. *Gasterosteus* (Togeuo).

Three spined stickle-back. The free spines three, the third spine preceding the dorsal fin ; gill openings restricted and united mesially to the isthmus ; sides of the body partly mailed.

Gasterosteus cataphractus, Pall.

A small stickle-back, the size of which exceeds no more than $5\frac{1}{2}$ cm. The distribution ranges extensively throughout Japan.

D. II $\frac{I}{10-12}$, A. I, 7-9(10), P. I, 1.

Body fusiform, slightly compressed ; caudal peduncle not compressed. Head rather small and pointed, still smaller in female ; mouth oblique, maxillaries hardly reach the eye. The ventral pubic plates lanceolate, its greatest width $1\frac{2}{3}$ in its length which equals the distance from the tip of snout to the post margin of pupil; the upper shoulder processes reach further beyond the upper base of the pectoral fin. The free spines laterally separated, long and stoutish, length equalling the snout. They are supported by membrane, but each is not continuous to the other ; the

third and the anal are short and curved, the length being the same or one third of the free spines; the ventral spine long, and its length equalling the snout and the pupil; it has a basal cusp, followed by a soft ray. The lateral armature above the pectorals; they are of six oblong plates which anteriorly diminish their size; no keel on the caudal peduncle. The colouration bronwish or bluish dark above, pale below and mottled. The vernacular name is *itono* from the striation of the lateral armature giving it the appearance of a skein of thread.

B. *Pygosteus*.

Many spined stickle-backs. The spines more than nine. The body naked or partly mailed. Gill openings confluent with a fold of gill membrane across the isthmus.

1. Body slender with a rather long caudal peduncle; free spines nine, long and divergent. *Pygosteus steindachneri*.
2. Body naked and not slender, with a rather long caudal peduncle; free spines nine, short and divergent. *Pygosteus brevispinosus*, n. sp.
3. Body thicker; free spines eleven, short. *Pygosteus undecimalis*.

Pygosteus steindachneri, Jordan & Snyder.

A long spined stickle back with a slender body. The specimens from Rebun, an islet on the north-eastern coast of Hokkaido. They are compressed with a depressed caudal peduncle.

The largest specimens are 7 cm long.

D. IX, (VIII rarely) 10-11 (occasionally 9 or 12), A. I, 10-11 (8 or 9), P. 10.

Height $4\frac{3}{4}$ in the length; in male the length is a little longer and slender with a pointed snout; depth $6\frac{2}{3}$. The diameter of eye equals snout or slightly longer, it is $3\frac{1}{2}$ in head; the interorbital space $\frac{2}{3}$ in eye; the maxillaries are far from reaching the anterior margin of eye, but reaching nearly below the nare. The dorsal spines divergent and without the supporting membrane; they are folded alternately when depressed, and the lengths are all equal; ventral spines long, the length equalling the snout and the pupil of eye, the lateral serrature weak and without cusp; the length of the pectoral fin equals the snout and eye together. The ventral pubic plates lanceolate, reaching the front margin of the vent. The armature small and continuous to the caudal base, forming a strong keel on the caudal peduncle. The ventral fins opposite each other. The fresh colour is dusky greenish pale above, the cheeks and the chin colourless. The spawning colour of some specimens from Sapporo is very dark and dusky.

Such Japanese names, concerning the stickle-backs, as *hariuo* or *haritoto*

(needle-fish) and *harusaba* (spring mackerel) are most probably the old distinguishing names for this species, for these names are casually seen in the literature describing local finny creatures. The range of distribution is extensive in Japan, abounding northward, and especially so in the island of Hokkaido.

Pygosteus brevispinosus, Otaki, n. sp.

D. IX, 11, A. I, 11 (9), P. 10.

Head 4; depth 5 in the length or $1\frac{1}{2}$ in head; snout 4 in head. Diameter of eye equals the snout or $3\frac{1}{2}$ times in the head; the interorbital space equals the snout; mouth oblique, the lower jaw not perpendicular as to give the chin angular appearance as it is in the *P. steindachneri*. The maxillaries short, barely reaching the under margin of the nostril. The dorsal spines much shorter than those of the former species, they are supported by a membrane; the length of them is two-thirds of the diameter of the eyes, the last is curved and longer, the length equalling the snout, and also the anal spine. The ventral spine long and laterally serrated, with a weak soft ray following, its length equals the distance from the tip of snout to the anterior margin of pupil. The bases of the dorsal and anal fins equal, and they are opposite each other. Body rather slender, devoid of the lateral armature except those of 5 or 6 small ones forming a keel on the caudal peduncle. The ventral pubic plates lanceolate, the length shorter and width narrower than those of *P. steindachneri*, and the former is three times the latter; the lateral pubic plate shorter and cuniform. The fresh colour yellowish pale green and dusky above, the belly, chin, and ventral fins colourless, in spawning specimens the entire body, fins and all, dusky or dusky black.

This species is a small darting fellow living in small streams in Sapporo, running from cold springs, where the bottom is fine muddy sand and full of swamp weeds. The largest size of the specimens we have taken is 5 or $5\frac{4}{5}$ cm long. From the same stream a number of *P. steindachneri* were taken.

Pygosteus undecimalis, Jorden & Starks.

Body elongated and thick, and completely smooth except narrow plates on the caudal peduncle, forming a keel. The ventral pubic plates absent or insignificantly small.

D. XI, 10-11 (rarely XI0-11), A. I, 9-10, P. 10.

Head obtuse with a shortish snout; its length 4 or scarcely 4 in the case of female; depth 5 or less; eye comparatively small, its diameter being $3\frac{2}{3}$ -4 in the head or the same with snout. The maxillaries barely reach the eye. The dorsal

spines are all equal, and they are thick and short, the last one slightly curved and longer; the anal spine same with the former and its length twice in the snout; the ventral spine simple and short, but a little longer than the last dorsal spine. The colouration in fresh is uniformly greenish olive above, silverly pale below, but in the spawning season the entire body, fins and all, very dusky with some darker punctuations on the sides.

摘 要

此の科に屬する種類に就ては、已に理學士**穴戸一郎**氏の詳しく記事(明治二十三年三月の動物學雜誌)あり。又岐阜市附近に産する *Gasterosteus aculeatus* の營巢法に就ては、教授**八田三郎**氏がなされたる實驗の記事(明治廿四年動物學雜誌)もあり。其後 **Jordan and Snyder** 兩氏の報告(米國博物館報第廿五卷)出て世に廣く知れ亘り、其の種類も三種類となせり。而して *Gasterosteus* の内三本背棘のものは、其體側にある鱗甲の全體にあると否らざるとに依りて區別せるもの多し。然し其の相違は產地と期節又は老幼の差に因りてなるを以て、**Dr. Günther** 又は **Dr. Day** 等は、右の相違は之を別種となすの價值なしと判定せり。而して **Dr. Jordan** は日本の三本背棘のものの *Gasterosteus cataphractus* 一種を記載し、其餘の二種を *Pygosteus* 屬となせり。

而して幸に本校所屬博物館に此科の標本を蒐集しあり、又當夏本學學生の採集したるもの、或は札幌附近を流るゝ清水の小流にて採集したる標本を比較考査なしたれば、其概要を記さん。

(一) 三本背棘ノモノ。

Gasterosteus cataphractus, Pall.

背棘三本あり、内二本は各々離隔して立ち、第三の一本は背鰭の前面に接近してあり。鱗甲は胸鰭の後邊に五枚乃至六枚あるのみにして、其他は皆裸なり。尾筒は圓く短かし。背鰭と

臀鰭の鰭條の數は一定ならざるも、甲には十本を普通とし、十二本までの相違あり、乙にて八本を普通とし、九本又は稀に十本あるものあり。棘は皆其兩側に鋸齒狀をなし、腹鰭の棘は長くして其後に不完全なる一刺を具へ、鰭膜を以て前者と連接す。體色は青色を帯ひたる暗褐色なり、腹部は色淡し。體側より腹に歪形斑文あり。魚の大きさは五乃至五半セメにして小なり。卵は大にして直徑三ミメあり、橙黄色を帶ふ。

産地は美濃の岐阜及武藏の玉川なり。後他の標本は皆な前地の産よりは較々小形なり。Dr. Günther 著英國博物館出版魚類目錄記載の *Gasterosteus aculeatus*, var *gymnurus*, C. 即ち本種類なるべし。

(二) 背棘九本以上ノ種類。

イ、*Pygosteus Steindachneri* Jordan & Snyder.

胴體は側扁延長にしてサワラの形狀に似たり。尾筒も又細長にして頭部も太からず。體は平滑、裸にして單た微小なる鱗甲體側に縦列一行にあるのみ、其後部は尾根に於て梁狀隆起を形成す、爲めに細き尾筒は扁平の狀を呈す。背棘は九本あり、皆細長にして交互に左右外方に向ふ、之を疊めば又背面正中に收まる、腹鰭の棘は殊に長し。腹面の耻骨板は細長にして劍狀なり、其尖端は肛門縁に及ぶ、側面にある左右耻骨は又長橢圓形にして、其上部は細く、胸鰭より高し。尾鰭は其後縁叉狀なり、然し老魚にては圓し、蓋し此小魚は其性活潑にして水中葦の間を游泳すること活潑に、或は又巢内に入出入する等より自然磨失して漸々圓縁となりたるものならん。體色は淡黄緑にして微小なる黒點密に散在す、其最密の場所は爲に叢雲の如し。腹部は色淡く、胸鰭の部は無色なり。産卵期節に至れば體の全部暗色となり、又殆ど暗黒となる。

標本の産地は札幌及禮文島にして、禮文島の産地より採り

たるもの七尾とも七セメありて、體色は全體淡なり。札幌には此種類最も普通なり、其大さは平均前産地のものよりは小さく、五セメのもの當標本中最大なり。

北陸地方にてハルサバ、カワサバと稱する此科の魚は多分本種なるべし。

ロ、*Pygosteus brevispinosus*, n. sp.

本種の外觀は(イ)と(ハ)の中間にして頭部は(ハ)に酷似して吻端鈍なり、尾部は(イ)の如く細長なり。而して背棘短小にして九本あり、腹鰭の棘は甚だ長し。體は平滑にして其形は紡錘狀なり、尾筒には軟弱細小の鱗甲ありて微かに梁狀をなす。背棘の長さ皆等大にして眼徑の三分二あり、最後の一本と臀鰭の前にある棘は少々長く少しく彎曲す。腹鰭條は發達不全なり、細長にして兩側鋸齒狀をなす腹棘と鰭膜にて連結す、背臀兩鰭は相對立し其長さ等同にして各九本の鰭條あり。腹面の劍狀をなす耻骨板は(イ)の種類のものより短狹なり、又其の左右兩側にあるものは楔狀をなして短かく(イ)(ハ)の兩種と異なる。今此種を *brevispinosus* と新しく名づけんとす。體色は淡褐或は淡綠色にして、微細の黒點全般に普く散在す、産卵期に於ては雄魚の體色は暗色を呈す。

札幌の清水の流るゝ小川に多く、(イ)種と同流に生存す。其體長は五セメ半のもの最大なり。

(ハ) *Pygosteus undecimalis*, Jordan & Starks.

吻端鈍にして、體狀は延長し、鱗甲を欠き、單た尾筒の兩側に細小のもの五六個梁狀をなして存し、體の全部は平滑なり。背に孤立せる棘は十一本あり、較々太くして長からず、膜を被ふる背鰭の前にある一本は、少しく長くして彎曲し、腹鰭の單棘と同じ。背臀兩鰭の棘は各々十本あり、稀に九本或は十一本あるもあり。腹面の耻骨板は微小にして、或は皮下にありて見へざ

るものあり。體色は普く淡綠色にして腹部少々銀白色を帶ぶ、産卵期に於ける雄魚の色は全部暗黒色に變ず。

此の種も又札幌及其附近の小流に少なからず。其體長は五セメより七セメ半を最大とす。

