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Notes on some Japanese and Chinese *Helice*
with *Helice (Helicana)* n. subgen., including
Helice (Helicana) japonica n. sp.
(Crustacea: Decapoda).

By

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With 19 figures and 1 table.

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Abstract: The present paper gives a taxonomic account of the Japanese and Chinese species of *Helice*. Specific rank is given to most of the subspecies and *Helice (Helicana) japonica* n. sp. is described. *Helicana* n. subgen. is proposed to include *wuana* and *japonica*. The Japanese and Chinese forms are classified as following: *Helice (Helice)* s. str.: *tridens tridens* DE HAAN 1835, *tr. sheni* T. SAKAI 1939, *tientsinensis* RATHBUN 1931, *formosensis* RATHBUN 1931, *latimera* PARISI 1918 (syn.: *pingi* RATHBUN 1931); *Helice (Helicana)* n. subgen.: *wuana* RATHBUN 1931 (as type species), *japonica* n. sp.

PARISI (1918) reported a new subspecies of the genus *Helice* DE HAAN 1835 from China and Formosa: *H. tridens latimera*. RATHBUN (1931) recorded the occurrence of four new subspecies of the same genus as well as the formerly known *tridens* DE HAAN 1835 from the same localities: *H. tr. tientsinensis*, *H. tr. formosensis*, *H. tr. pingi*, *H. tr. wuana* and *H. tr. tridens*, but she misinterpreted PARISI's subspecies. The present authors compared the ♀ type specimen of *latimera* s. str. with RATHBUN's four subspecies and could identify *pingi* RATHBUN 1931 from China as a synonym of *latimera* PARISI 1918.

Investigation on the 1st pleopods of the ♂♂ reveals that *tr. tridens*, *tr. tientsinensis*, *tr. formosensis* and *tr. latimera* are very distinct from *tr. wuana*. As far as *tr. wuana* is concerned, which has been recorded from China, Formosa and Japan, it is evident that the W-Japanese specimens represent a new species (*H. japonica* n. sp.). In addition, the subspecies mentioned above are ranked to species level except *tr. sheni* T. SAKAI 1939, the relation of which to *H. tridens* is still problematic. The species are arranged into two subgenera, *Helice (Helice)* s. str. including *tridens*, *tr. sheni*, *tientsinensis*, *formosensis* and *latimera*, and *Helice (Helicana)* n. subgen. for *wuana* and *japonica* n. sp.

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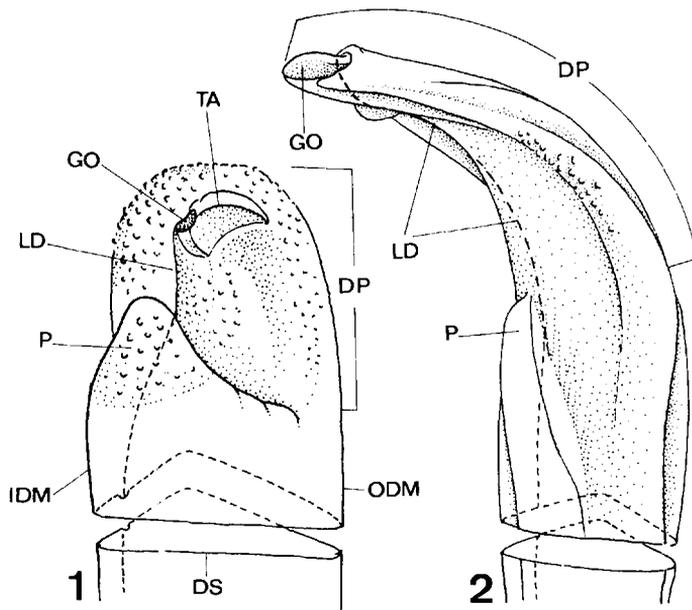
Abbreviations used: MBIK = Usa Marine Biological Institute, Kōchi University, Tosa; MCM = Museo Civico di Storia Naturale, Milano; SMF = Natur-Museum und Forschungs-Institut Senckenberg, Frankfurt am Main; USNM = National Museum of Natural History, Smithsonian Institution, Washington, D. C.

***Helice (Helice)* DE HAAN 1835.**

1835 *Ocypode (Helice)* DE HAAN, Fauna japon. Crust., : 28.

Type species: *Ocypode (Helice) tridens* DE HAAN 1835 [by monotypy].

Definition: Lateral margins of carapace trilobed, 3rd anterolateral tooth rudimentary. 1st granulate line on branchial region short, arising from 2nd anterolateral tooth; 2nd one longer, arising from 3rd anterolateral tooth. Palm of cheliped smooth to naked eye and without any carina. Distal part of



Figs. 1-2. Morphology of left 1st ♂ pleopod in dorsal view, showing terms used in description. — DP = Distal part of stem, DS = Dorsal surface of stem, GO = Genital opening, IDM = Inner-dorsal margin of stem, LD = Longitudinal ditch, ODM = Outer-dorsal margin of stem, P = Palp, TA = Terminal accessory. — 1) *Helice (Helice) tridens tridens*; 2) *Helice (Helicana) japonica*.

1st pleopod of the male short and broad; dorsal surface of stem flattened and wholly calcified; palp broad and triangular; terminal accessory situated dorsally; genital opening lying on the ventral side of terminal accessory.

Species included: *tr. tridens* DE HAAN 1835, *tr. sheni* T. SAKAI 1939, *tientsinensis* RATHBUN 1931, *formosensis* RATHBUN 1931, *latimera* PARISI 1918.

Remarks: *H. (H.) tridens sheni* is tentatively ranked at the subspecies level, because its most important characters are not known except for the stridulating ridge.

***Helice (Helice) tridens tridens* DE HAAN 1835.**

Figs. 1, 3, 9.

1835 *Ocypode (Helice) tridens* DE HAAN, Fauna Japonica, Crust.: 57, pl. 11 fig. 2, pl. 15 fig. 6.

1936 *Helice tridens tridens*, — KAMITA, Fisheries of Korea, 133: 2, text-figs. 1-2.

1939 *Helice tridens tridens*, — T. SAKAI, Stud. crabs Japan, 4: 692, text-fig. 121a-c, pl. 77 fig. 2.

1976 *Helice tridens tridens*, — T. SAKAI, Crabs Japan adjac. Seas, : 669, text-fig. 365 [after T. SAKAI 1939], pl. 228 fig. 3.

Nec:

1931 *Helice tridens tridens*, — RATHBUN, Lingnan Sci. J., 8: 90, pl. 7 fig. 6, pl. 8 fig. 16, pl. 9 fig. 21 [= *Helice (Helice) formosensis* and *H. (Helicana) wuana*].

Material examined: Ryukyu-retto: Kerama-gunto, Tokashiki-jima (Island), Amaren (1♂ SMF 8820, 2♂ SMF 8482). — Japan: Kagoshima, Iriki-gawa (River) (1♂ 3♀ MBIK 101). — Fukuoka, west side of Hakata-wan (Bay) (20♂ MBIK 119). — Fukuoka, Muromi (5♂ 3♀ SMF 8481, 2♂ 6♀ MBIK 111). — Fukuoka, Tatara-gawa (2♂ 1♀ MBIK 108). — Fukuoka, Tsuyazaki (6♂ 10♀ MBIK 139). — Okayama (1♂ 2♀ MBIK 105). — Sagami-wan (2♂ 1♀ SMF 7770). — Miura Pen. (1♂ 1♀ SMF 7622).

Diagnosis: Stridulating ridge of ♂ consists of 12-24 thick protuberances, innermost one elongate and finely striated vertically. In ♀ it bears 20-25 rounded granules spaced. Carpi and propodi of 1st and 2nd ambulatory legs with thick fur on their anterior surfaces. Palp of 1st pleopod of ♂ semicalcified, taking a small triangular form in dorsal view, and its ventral surface scarcely separated from the stem.

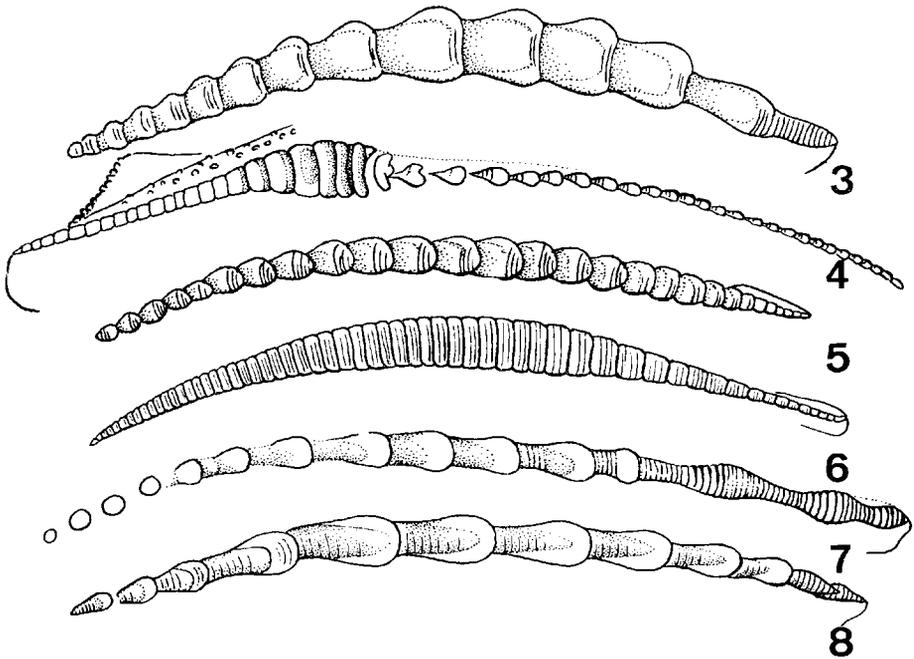
Description: The carapace is broader than long. The dorsal surface is evenly beset with numerous depressed granules among a fine granulation except of the cardiac and intestinal regions, which are pitted. The mesogastric region is well defined, its anterior lobe is impressed in front, and continuous with the median furrow of the frontal region. The cardiac furrow is distinct. The cervical grooves are discernible, reaching anteriorly to the 1st lateral tooth. The upper orbital margin is oblique. The postero-lateral margin of the carapace is slightly divergent posteriorly. The branchial region presents three granulate lines subparallel to one another; the first one is rather short. The suborbital ridge of the ♂ (Fig. 3) consists of 12-24 thick protuberances, each of which is faintly striated vertically in its inner part; the innermost one is elongated transversally and finely striated vertically. The protuberances mentioned above are observed to

be variable in number; 24 for the material from Ryukyu-retto (SMF 8482), 12-15 for those from Fukuoka region (SMF 8481), and 17-18 for those from Sagami-wan (SMF 7770). In ♀♀ this stridulating ridge is composed of 20-25 rounded and spaced granules.

The palm of the cheliped is in ♂♂ 1.6 times as long as high and in ♀♀ 1.7 times; the outer surface is smooth to the naked eye. The inner angle of the carpus bears a strong tooth and another strong one just below it.

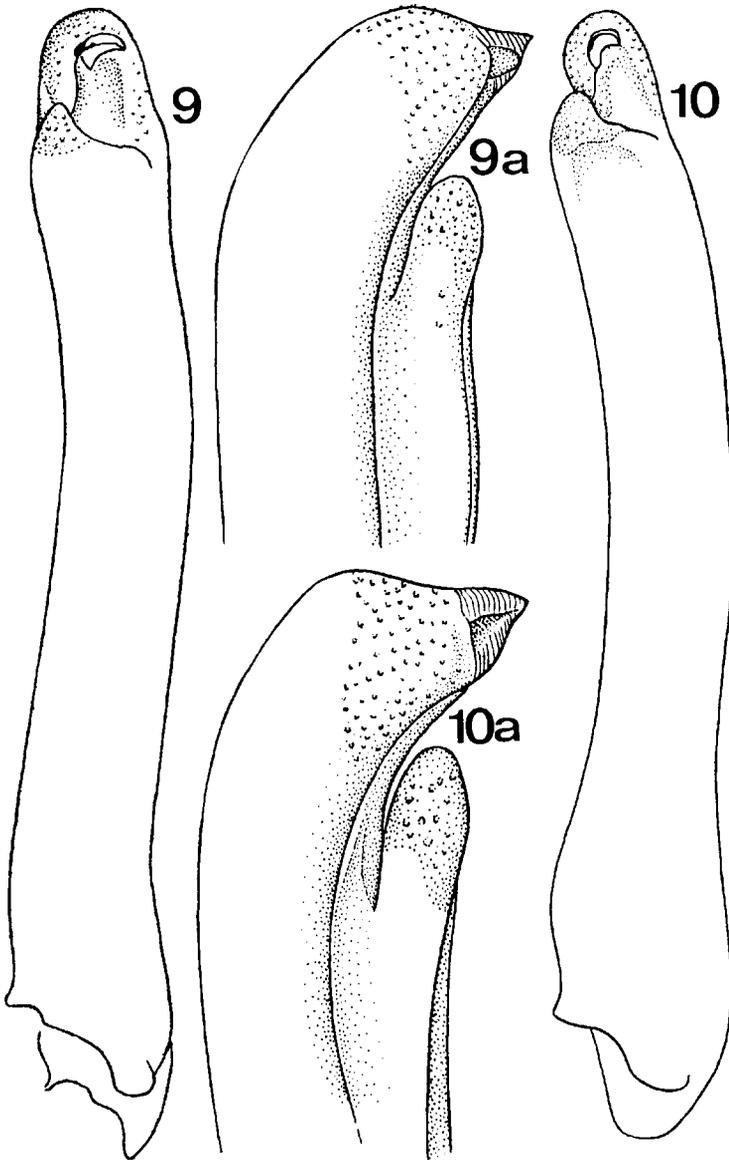
In ♂ and ♀ the carpi of the 1st and 2nd ambulatory legs are provided with thick fur in the distal half of their anterior surface. The propodus of the 1st ambulatory leg bears thick fur on its whole anterior surface, and that of the 2nd only in the upper $\frac{3}{5}$ - $\frac{2}{3}$ of its anterior surface. The 3rd and 4th ambulatory legs are naked.

The 1st pleopods of the ♂ (Figs. 1, 9) are elongate. The inner dorsal margin of the stem is straight in dorsal view. The palp is a small triangle, the outer margin of which reaches proximally the median line of the dorsal surface; the dorsal surface is hairy, convex and semicalcified, and the ventral surface is scarcely separated from the stem (Fig. 9a).



Figs. 3-8. Stridulating ridges of ♂♂. — 3) *Helice (Helice) tridens tridens*, MBIK 119; 4) *Helice (Helice) tientsinensis*, holotype, USNM 25431; 5) *Helice (Helice) formosensis*, holotype, USNM 55371; 6) *Helice (Helice) latimera*, holotype of *H. pingi*, USNM 59163; 7) *Helice (Helicana) wuana*, holotype, USNM 61874; 8) *Helice (Helicana) japonica*, holotype, SMF 8668.

Distribution: Japan, from Aomori Prefecture (T. SAKAI 1976) to Ryukyu-retto, and Korea (KAMITA 1936).



Figs. 9-10. Left ♂ 1st pleopod. — 9) *Helice (Helice) tridens tridens*, dorsal view, MBIK 119; 9a) Tip in inner-ventral view, same specimen; 10) *Helice (Helice) tientsinensis*, dorsal view, holotype, USNM 25431; 10a) Tip in inner-ventral view, same specimen.

Remarks: This species is very closely related to *tientsinensis* as evident from the form of the 1st pleopods.

As far as the distribution of the present species is concerned, it has been reported from Japan, Korea, Formosa and N- and S-China, however it is very doubtful that this species occurs in Formosa and S-China. The present authors re-examined the specimens from Formosa identified by RATHBUN (1931: 90) as *tr. tridens* and found that they belong to *formosensis* and *wuana*. As a result, it is possible that this species does neither occur in Formosa nor in S-China. In all cases much more material from the Chinese mainland and Formosa needs to be checked.

***Helice (Helice) tridens sheni* T. SAKAI 1939.**

1932 *Helice tridens tridens*. — SHEN, Zool. sinica, (A) 9 (1): 203, text-figs. 126-127, pl. 8 figs. 1-2 [nec *tridens* DE HAAN 1835].

1939 *Helice tridens sheni* T. SAKAI, Stud. crabs Japan, 4: 694, text-figs. 123a-c.

1976 *Helice tridens sheni*, — T. SAKAI, Crabs Japan adjac. Seas. : 670, text-figs. 367a-c.

Remarks: This subspecies was originally reported by SHEN (1932) as *tr. tridens* from Peidihli Bay and Shantung Peninsula in N-China. T. SAKAI (1939) separated this subspecies from *tridens* on the ground that the tubercles of the stridulating ridge number 17 in ♂♂, the 5-6 innermost of which are entirely confluent with fine vertical striae. As far as the present authors know, *sheni* differs from *tridens* s. str. only by the feature of the stridulating ridge.

***Helice (Helice) tientsinensis* RATHBUN 1931.**

Figs. 4, 10-11.

1931 *Helice tridens tientsinensis* RATHBUN, Lingnan Sci. J., 8: 92, pl. 7 fig. 9, pl. 8 fig. 19, pl. 9 figs. 27-28.

1932 *Helice tridens tientsinensis*, — SHEN, Zool. sinica, (A) 9 (1): 210, text-figs. 130-131, pl. 8 figs. 5-6.

1936 *Helice tridens tientsinensis*, — KAMITA, Fisheries of Korea, 133: 3, text-figs. 3-4.

1976 *Helice tridens tientsinensis*, — T. SAKAI, Crabs Japan adjac. Seas. : 671-672, text-figs. 369a-b.

Material examined: China: Tientsin, Chili (1♂ [24.6 × 29.0 mm] holotype, (Fig. 11); 1♀ [27.0 × 33.0 mm] paratype, USNM 25431).

Diagnosis: Stridulating ridge of ♂ with 52 protuberances, its median part thickened in a molar-form, and that of ♀ with 37 uniform granules. Carpus and propodus of 1st ambulatory leg in ♂ with thick fur on their anterior surfaces. 1st pleopods with a small, semicalcified palp; the ventral surface widely separated from stem.

Description: The carapace is broader than long. The dorsal surface is minutely granulate and evenly pitted in ♂♂; in ♀♀ it is provided with depressed granules in its anterior half and pitted in its posterior half. The mesogastric region is discernible and its anterior lobe is continuous with the median furrow of the frontal region. The cardiac furrow shows a narrow slit. The cervical grooves are not discernible around the base of the 1st lateral tooth,



Fig. 11. *Helice (Helice) tientsinensis*, holotype, USNM 25431.

so that the hepatic and branchial regions are continuous to each other. The upper orbital margin is oblique. The postero-lateral margins of carapace are slightly divergent posteriorly; in dorsal view the maximum breadth lies between the postero-lateral angles. The stridulating ridge of the ♂ (Fig. 4) is composed of 52 protuberances, the 18 inner ones of which are confluent with one another and finely striate vertically, successively overlapping with a median molar-formed thickness divided into seven vertical carinae; and the outer half consists of 26-27 small spaced tubercles.

The palm of the chelipeds is in ♂♂ 1.4 times as long as high and in ♀♀ 1.6 times; the outer surface is smooth. The inner angle of the carpus is provided with a strong tooth and another strong one below it.

In ♂♂ the carpus of the 1st ambulatory leg bears thick fur on the distal margin of its anterior surface; the propodus bears thick fur all over its anterior surface as well. The 2nd ambulatory legs are naked.

The 1st pleopods are elongate (Fig. 10). The distal part of the stem is narrower than in *tridens*. The inner-dorsal margin of the stem is distally curved inward in dorsal view and successively passes to that of the palp. The palp is rather small and semicalcified as in *tridens*; the ventral surface is widely separated from the stem (Fig. 10a).

Remarks: The present species is closely related to *tridens* from Japan, however, it is different in that the dorsal surface of the carapace is more vaulted transversely than in *tridens*, and in ♂♂ evenly pitted among a minute granulation; the cardiac furrow is less distinct; the cervical grooves are not developed anteriorly around the base of the 1st lateral tooth; the dorsal margin of the palm of the cheliped is rounded and well ledged, and the carpus and propodus of the 1st ambulatory legs bear dense fur in ♂♂ as it does in *formosensis* and *latimera*.

Distribution: N-China (RATHBUN 1931) to the w-coast of Korea (KAMITA 1936).

***Helice (Helice) formosensis* RATHBUN 1931.**

Figs. 5, 12-13.

- 1918 *Helice tridens latimera* PARISI, Atti Soc. ital. Sci. nat., 57: 106 [partim], text-fig. 4b [nec *H. tridens latimera*].
 1931 *Helice tridens tridens*, — RATHBUN, Lingnan Sci. J., 8: 90 [partim], pl. 7 fig. 6, pl. 8 fig. 16, pl. 9 fig. 21 [nec *tridens* DE HAAN 1835].
 1931 *Helice tridens formosensis* RATHBUN, Lingnan Sci. J., 8: 91, pl. 8 fig. 18, pl. 9 fig. 22.
 1939 *Helice tridens latimera*, — T. SAKAI, Stud. crabs Japan, 4: 693, text-figs. 122a-c.

Material examined: Formosa: Taihoku, Giran (1♂ [25.8 × 31.5 mm], holotype, USNM 55371, Fig. 12). — Formosa (2♂ [25.0 × 31.0; 22.5 × 28.0 mm], USNM 57465: these were among the 3♂♂ determined by RATHBUN (1931) as *tr. tridens*).

Diagnosis: Stridulating ridge of the ♂ consists of 21-28 protuberances; 6-7 innermost ones confluent with one another and provided with fine vertical striae. Carpus and propodus of 1st ambulatory legs bear in ♂ dense fur on their anterior surfaces. Palp of 1st pleopods is formed as a large triangle and not semicalcified; inner margin convex proximally and ventral surface distinctly spaced from stem.

Description: The carapace is broader than long. Its dorsal surface is finely granulate under the binocular; the anterior half is provided with small depressed granules among a minute granulation, while the posterior half is evenly pitted. The mesogastric region is well defined and continuous anteriorly with the median furrow of the frontal region. The cardiac furrow forms a narrow slit, but its both sides are deep. The cervical grooves are not discernible around the base of the 1st lateral tooth. In dorsal view the frontal region seems to be less high, but in frontal view it is distinctly expanded and its antero-lateral angles are rounded and pass without any transition into the orbital margins.

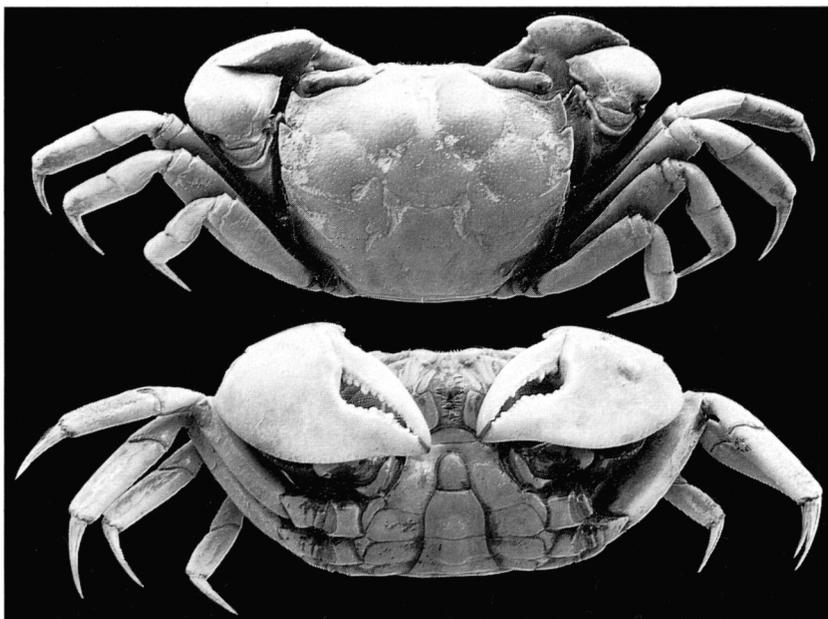


Fig. 12. *Helice (Helice) formosensis*, holotype, USNM 55371.

The postero-lateral margins of the carapace are straight and slightly convergent posteriorly. The stridulating ridge of the ♂ (Fig. 5) consists of 21-28 thick and somewhat vertically elongate protuberances. These protuberances are spaced with one another and clearly striated vertically in their inner half, the 6-7 innermost ones of them are confluent and striated vertically.

The palm of the chelipeds is 1.4 times as long as high in ♂♂; the outer surface is smooth.

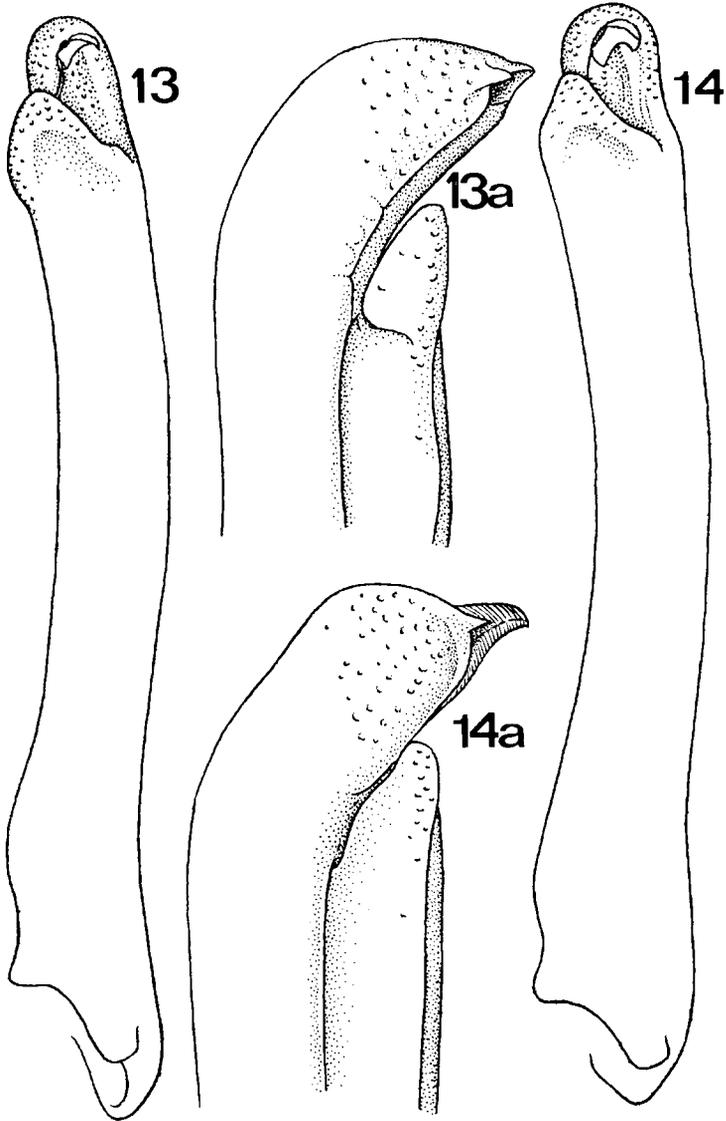
The carpi of the 1st and 2nd ambulatory legs of the ♂♂ bear thick fur on their distal margins. The propodus of the 1st ambulatory leg bears dense fur on its anterior surface, and that of the 2nd ambulatory leg is naked.

The 1st pleopods are rather slender (Fig. 13). The inner-dorsal margin of the stem is slightly vaulted inward in its distal half. The palp is broadly triangular; the inner margin is slightly convex, and the outer margin reaches proximally just the outer-dorsal margin of the stem; the dorsal surface is not semi-calcified as in *latimera* and depressed in its median part, and the ventral surface is evidently spaced from the stem (Fig. 13a).

Distribution: Formosa, possibly endemic.

Remarks: The present species is synonymized by T. SAKAI (1939) with PARIS's *latimera* s. str., however, *latimera* is based on the ♀ holotype from China, which is not identical with the present species *formosensis*. In *formosensis* the dorsal surface of the carapace is slightly less vaulted transversely than in *latimera*; the meri of the ambulatory legs are rather slender and the 1st granulate

line on the branchial region is less distinct and longer, and runs more inward than in *latimera*. On the other hand it is evident that the ♂ specimen from Formosa included in *latimera* by PARIS (1918: 106, MCM 1652) and thus a



Figs. 13-14. Left ♂ 1st pleopod. — 13) *Helice (Helice) formosensis*, dorsal view, holotype, USNM 55371; 13a) Tip in inner-ventral view, same specimen; 14) *Helice (Helice) latimera*, dorsal view, holotype of *H. pingi*, USNM 59163; 14a) Tip in inner-ventral view, same specimen.

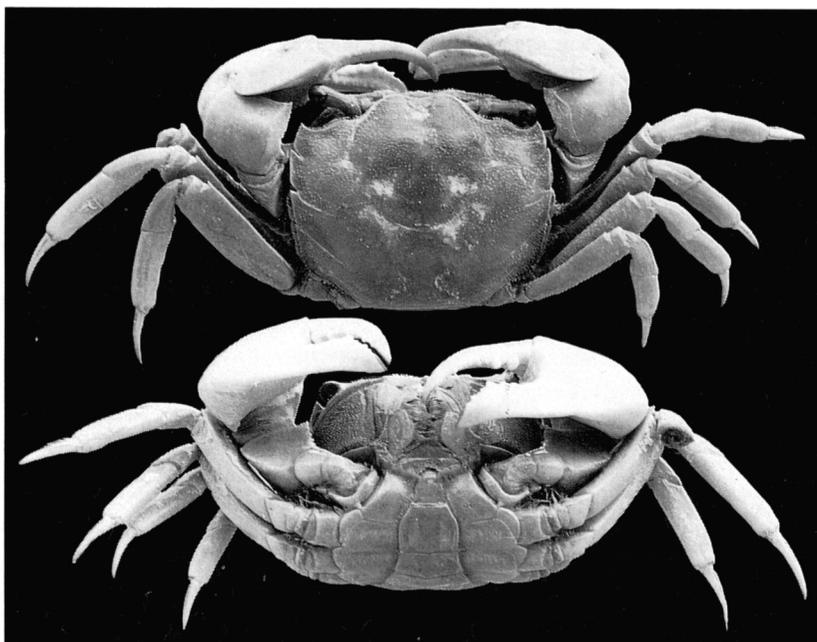


Fig. 15. *Helice (Helice) latimera*, holotype of *H. pingi*, USNM 59163.

paratype, has a stridulating ridge identical in structure to the present species as shown by T. SAKAI.

The present species is, however, closely related with *latimera* as shown by the form of the 1st pleopod.

***Helice (Helice) latimera* PARISI 1918.**

Figs. 6, 14-15.

1918 *Helice tridens latimera* PARISI, Atti Soc. ital. Sci. nat., 57: 106 [partim], text-figs. 4a, 4c-d [nec 4b = *formosensis*], pl. 8 fig. 3.

1931 *Helice tridens pingi* RATHBUN, Lingnan Sci. J., 8: 91, pl. 8 fig. 15, pl. 9 figs. 23-24.

Material examined: China: Hainan (1♂ [26.0 × 31.2 mm], holotype of *pingi*, USNM 59163). — Foochow (1♂ [21.3 × 26.0 mm], 1♀ [15.0 × 18.0 mm], USNM 75442). — China (1♀ [25.5 × 32.5 mm], holotype of *latimera*, MCM 1651). — China (1♂ damaged, USNM 76745).

Diagnosis: Stridulating ridge of the ♂ divided by narrow vertical grooves into 64-67 sections, each of which is striated vertically. In ♀♀ it consists of 47-55 small rounded granules. Carpus and propodus of 1st ambulatory leg of the ♂♂ bear dense fur on its anterior surface; ♀ propodus of 2nd one bears dense fur on its anterior surface. Palp of 1st pleopod broadly triangular and not semicalcified; the ventral surface situated close to the stem.

Description: The carapace is broader than long. The dorsal surface is evenly pitted among a minute granulation except around the inner angle of the orbit which bears some depressed granules. The mesogastric region is vaulted in its anterior lobe in the large ♂ (USNM 59163, Fig. 15), so that it is discontinuous with the median furrow of the frontal region, while in the not fully grown ♂ (USNM 75442) the mesogastric region is much defined and continuous anteriorly with the median furrow of the front. The cardiac furrow is very distinct and its both sides are remarkably depressed in a Y-shape. The cervical grooves are not discernible around the base of the 1st lateral tooth of the carapace. In frontal view the frontal region is largely deflexed. The stridulating ridge of the ♂ (Fig. 6) is divided by narrow vertical grooves into 64-67 sections, each of which is striated vertically. In ♀♀ it consists of 47-55 small rounded granules, that is, 47-52 for the holotype specimen from China (MCM 1651) and 55 for the other ♀ from Foochow (USNM 75442). The postero-lateral margins of the carapace are almost subparallel.

The palm of the cheliped is in ♂♂ 1.7 times as long as high and in ♀♀ 1.8 times; the outer surface looks smooth. The inner angle of the carpus bears one strong tooth and other small and strong ones just below it.

The 1st pleopods are elongate (Fig. 14). The palp is broadly triangular; the outer margin does not reach proximally the outer-dorsal margin of the stem; the dorsal surface is not semicalcified and concave in its median part; the ventral surface is close to the stem (Fig. 14a).

Distribution: S-China.

Remarks: RATHBUN (1931) suspected *latimera* s. str. to be synonymous with *tridens*, however, the specimens determined as *tridens* by RATHBUN (1931) turned out to belong to *formosensis* (2♂) and *wuana* (1♂), though she (1931: 91) suggested that *formosensis* is "probably not *H. tridens latimera*" without giving any reason for this suggestion.

The ♀ holotype of the present species (MCM 1651) from China was re-examined. The stridulating ridge in the type is beset with 47-52 small rounded granules, and that in a small ♀ from Foochow (USNM 75442) with 55. Other than this character, it is observed in the ♀ that the dorsal surface of the carapace is vaulted transversely, the 1st granulate line on the branchial region is evident but short, and the meri of the ambulatory legs are remarkably high. From these observations it is concluded that *pingi* is synonymous with the present species *latimera*.

The ♂ stridulating ridge and the 1st pleopods are as specific as in other species.

The distinguishing external characters of the forementioned species are summarized in Table 1.

***Helice (Helicana)* n. subgen.**

Type species: *Helice tridens wuana* RATHBUN 1931.

Definition: Lateral margins of carapace trilobed, 3rd lateral tooth rudimentary. 1st granulate line on the branchial region short. Distal part of

1st pleopod slender distally and largely curved dorsally; the dorsal surface of the stem slightly concave and semicalcified; the palp small; the genital opening rounded and situated apically.

Species included: *wuana* RATHBUN 1931 and *japonica* n. sp.

Remarks: The present subgenus is established for the reason that the structure of the 1st pleopod of ♂ is fundamentally different from that of the species of the preceding subgenus *Helice*. In both subgenera the median furrow of the frontal region is smoothly concave.

***Helice (Helicana) wuana* RATHBUN 1931.**

Figs. 7, 16, 18.

1931 *Helice tridens wuana* RATHBUN, Lingnan Sci. J., 8: 92, pl. 7 fig. 8, pl. 8 fig. 17, pl. 9 figs. 25-26.

1931 *Helice tridens tridens*, — RATHBUN, Lingnan Sci. J., 8: 90 [partim].

Material examined: China: Chekian Prov., Wenchow (1♂ [18.0 × 21.0 mm], holotype, USNM 61874, (Fig. 18); 1♂ [17.5 × 20.5 mm], USNM 62007). — Formosa: W-coast near Mai-liao, transition zone between supralittoral salt marsh and eulittoral mud flat (1♂ [19.0 × 23.5 mm], SMF 8667, specimen of DÖRJE 1978). — Formosa (1♂ [20.5 × 24.5 mm], USNM 57465, one of three specimens determined by RATHBUN 1931 as *tr. tridens*).

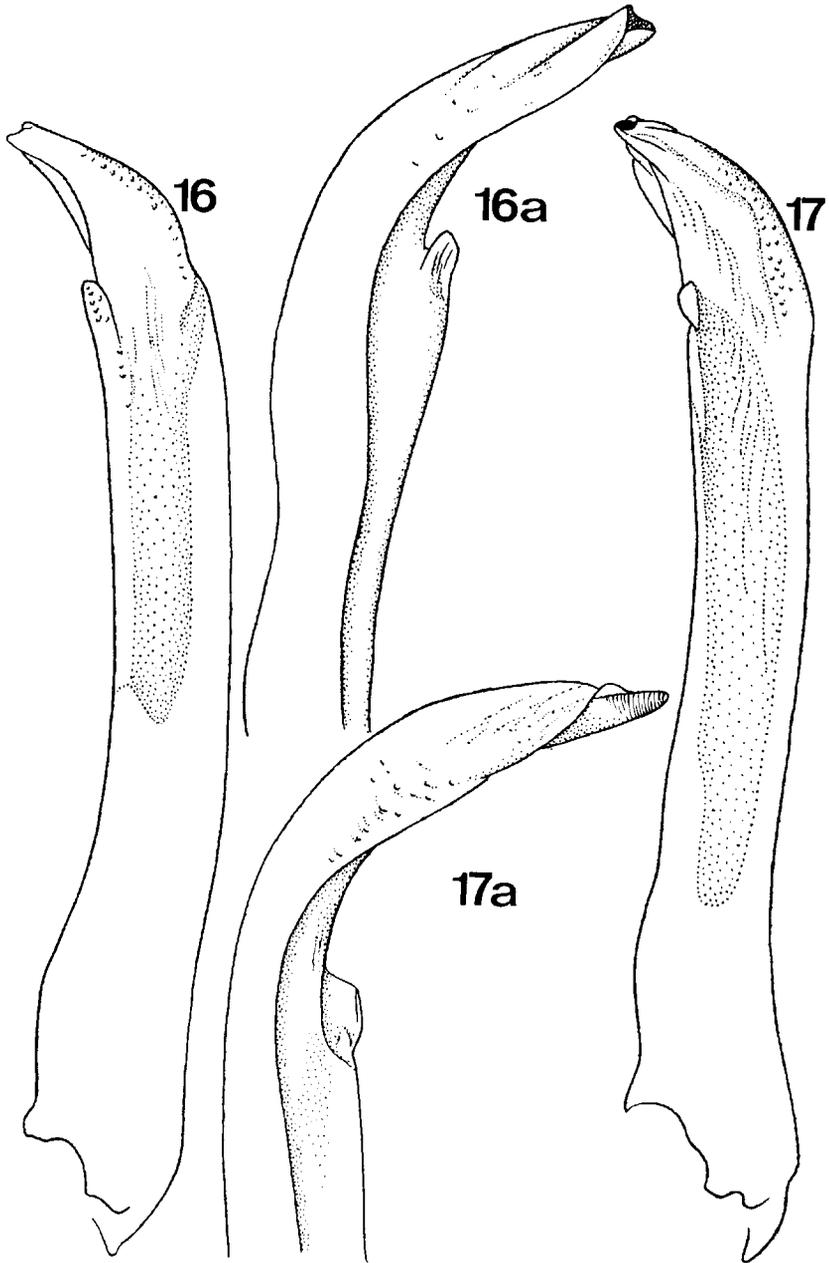
Diagnosis: Suborbital crest of the ♂ with 15 protuberances, the four innermost of which are finely striated vertically. Carpi and propodi of first three ambulatory legs bear dense fur on their anterior surfaces. The distal part of 1st pleopod elongate and largely curved dorsally; palp small, narrow and slightly protuded distally; genital opening situated apically on the ventral side.

Description: The carapace is broader than long, and its dorsal surface is rather flattened transversely. The mesogastric and protogastric regions are continuous with each other and also flattened. The cervical grooves are barely discernible. The cardiac furrow is distinct. The lateral margins of the carapace are trilobed, the 3rd lateral tooth is rudimentary. The branchial regions present three granulate lines, the 1st one is short, arising from the 2nd lateral tooth, the 2nd is rather long, arising from the rudimentary 3rd lateral tooth, and the 3rd is straight and lies above the 4th ambulatory leg. The postero-lateral margins are straight and slightly divergent posteriorly. The suborbital ridge of the ♂ (Fig. 7) shows 15 elongate protuberances; the four innermost ones are confluent with one another and finely striated vertically.

The palm of the chelipeds is in ♂♂ 1.7 times as long as high, its ventral margin is swelling medially. The outer surface is granulate imperceptibly under the binocular. The inner angle of the carpus bears a strong tooth and just below it bears also two strong and 3-4 small teeth.

Carpi and propodi of the 1st and 2nd ambulatory legs bear dense fur on their anterior surfaces, and those of the 3rd only in the upper half of the anterior surface.

The 1st pleopods of the ♂ (Fig. 16) are slender; the distal part is elongate and curved dorsally. The dorsal surface of the stem is slightly concave and semicalcified in its anterior half. The inner-dorsal margin forms a short narrow



Figs. 16-17. Left ♂ 1st pleopod. — 16) *Helice (Helicana) wuana*, dorsal view, holotype, USNM 61874; 16a) Tip in inner-ventral view, same specimen; 17) *Helice (Helicana) japonica*, dorsal view, holotype, SMF 8668; 17a) Tip in inner-ventral view, same specimen.

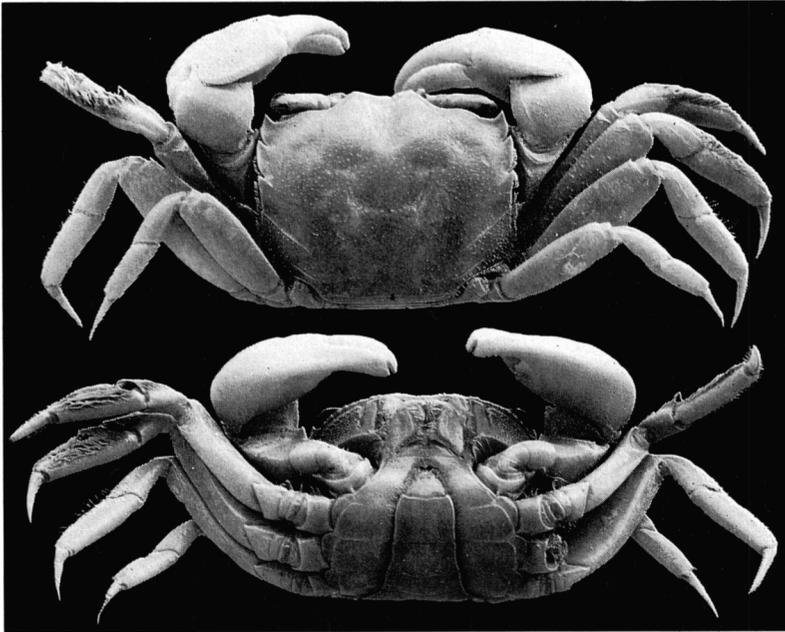


Fig. 18. *Helice (Helicana) wuana*, holotype, USNM 61874.

palp distally, which is clearly separated from the stem (Fig. 16a). The longitudinal ditch leads distally to the rounded genital opening situated apically on the ventral side.

Colour in alcohol is almost faded away, however the carapace is largely spotted by obscure maroon.

Distribution: S-China and Formosa.

Remarks: The present species has been treated as a variety of *tridens*, however, it is very different from all species of *Helice (Helice)* s. str. regarding the 1st pleopods and the stridulating ridge.

The present authors examined the holotype from China and found that the stridulating ridge consists of 15 protuberances, the four innermost of which are confluent and finely striated vertically. The same structure is also observed in the ♂ from the same locality (USNM 62007). However, the stridulating ridges of the examined ♂♂ from Formosa (SMF 8667, USNM 57465) are different from that from China, though the number of protuberances of the stridulating ridge is 15 as well, only the innermost one of the 15 protuberances is elongate and finely striated vertically in the Formosa specimens.

The few specimens available for study do not permit to draw any conclusions from this difference. Only the examination of an important material will give the opportunity to decide if the difference mentioned is constant or in the variation range of the species. It is important to note that there is no difference between the first pleopods of the Chinese and Formosan specimens.

***Helice (Helicana) japonica* n. sp.**

Figs. 2, 8, 17, 19.

- 1932 ? *Helice tridens wuana*, — SHEN, Zool. sinica, (A) 9 (1): 208, text-figs. 128-129, pl. 8 figs. 3-4.
 1936 ? *Helice tridens wuana*, — KAMITA, Fisheries of Korea, 133: 5 [partim], text-figs. 5, 7 [nec text-fig. 6].
 1939 *Helice tridens wuana*, — T. SAKAI, Stud. crabs Japan, 4: 695 [partim], text-fig. 124.
 1976 *Helice tridens wuana*, — T. SAKAI, Crabs Japan adjac. Seas. : 671, text-figs. 368a-b.

Holotype: ♂ [20.0 × 25.2 mm], SMF 8668; Japan, Fukuoka, estuary of Muromi-gawa, w-side of Hakata-wan (Fig. 19).

Paratypes: 1♂ [17.3 × 21.3 mm], USNM 171513, same data as holotype. — 1♀, MBIK 96; Fukuoka, Tatara-gawa. — 1♂ 3♀, MBIK 97; 1♂ [18.0 × 22.3 mm], SMF 8669; Fukuoka, Wajiro. — 2♀, MBIK 94; Fukuoka.

Diagnosis: Stridulating ridge of the ♂ with 10-11 protuberances, the innermost one of which is elongate and finely striated vertically. Distal part of 1st pleopod largely curved dorsally; palp obtuse and not separated from the stem; genital opening situated dorsally.

Description: The carapace is broader than long, and its dorsal surface is vaulted transversely. The dorsal surface is evenly punctate with short setae among a minute granulation. The mesogastric region is slightly vaulted and its anterior lobe is barely defined. The protogastric region is also slightly vaulted. The cardiac furrow is distinct. The cervical grooves are remarkable except around the base of the 1st lateral tooth. The lateral margins of the carapace are trilobed, the 3rd tooth is rudimentary. The branchial regions present three granulate lines, the 1st one of which is extremely short. The postero-lateral margins are divergent posteriorly so that the maximum breadth lies between the postero-lateral angles. The stridulating ridge of the male (Fig. 8) consists of 10-11 protuberances, the innermost one of which is elongate and finely striated vertically. The stridulating ridge of the female has 12 rounded tubercles.

The palm of the cheliped is in ♂♂ about 1.8-2.0 times as long as high, and its outer surface is minutely granulate under the binocular. The inner angle of the carpus bears a strong tooth and the inner margin below it is beset with 2-5 small teeth.

The arrangement of dense fur on the ambulatory legs shows the same pattern as in *wuana*.

The dorsal surface of the 1st pleopod (Fig. 17) is slightly concave and semicalcified in its distal two-thirds. The inner-dorsal margin of the stem forms an obtuse palp at its tip, which is not separated from the stem (Fig. 17a). The inner-ventral surface of the stem is smooth. The longitudinal ditch on the inner-ventral surface is directed to the dorsal surface distally and leads to the oval genital opening apically situated on the dorsal side.

The colour of living animals is olive, marbled with many small purple spots.

Distribution: Japan; probably also Korea and N-China.

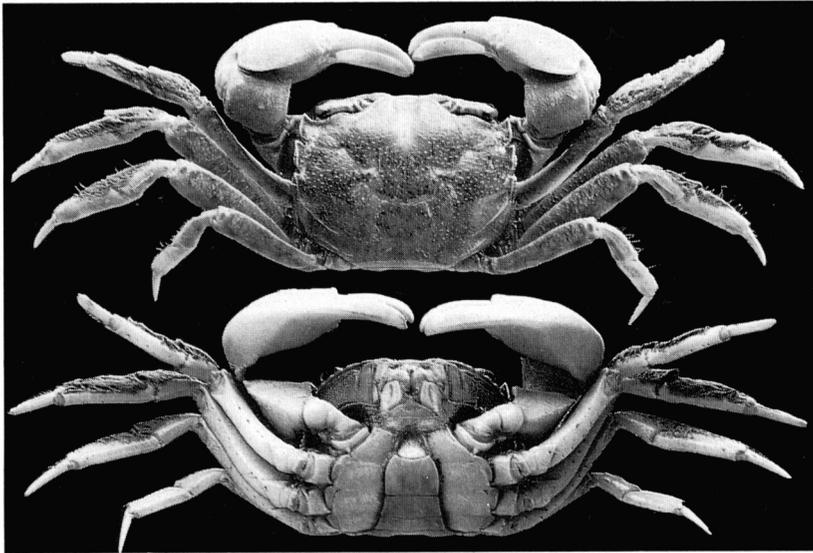


Fig. 19. *Helice (Helicana) japonica*, holotype, SMF 8668.

Remarks: In the published accounts, the present new species has been confused with *wuana* from China and Formosa, however, it is very distinct from the latter by the characters tabulated below.

japonica n. sp.

Carapace slightly vaulted transversely. Mesogastric and protogastric regions slightly vaulted.

♂ stridulating ridge with 10-11 protuberances, the innermost one elongate and finely striated vertically.

Palm of cheliped 1.8-2.0 times as long as high.

Genital opening of 1st pleopod apically situated on dorsal side.

Palp of 1st pleopod obtuse, and close to stem.

Inner-ventral surface of 1st pleopod smooth.

Coloured with olive, marbled with many small purple spots.

wuana RATHBUN 1931.

Carapace rather flattened transversely. Mesogastric and protogastric regions less vaulted.

♂ stridulating ridge with 15 protuberances, the innermost one of South-Chinese specimens, or 4 innermost ones of Formosan specimens confluent and finely striated vertically.

Palm 1.7 times as long as high.

Genital opening apically situated on ventral side.

Palp low and narrow, and separated from stem.

Inner-ventral surface of 1st pleopod slightly wrinkled.

With some maroon marks in the Formosan preserved specimen (SMF 8667).

Tab. 1. External characters of species of the subgenus *Helice*.

<i>tridens</i>	<i>tientsinensis</i>	<i>formosensis</i>	<i>latimera</i>
Postero-lateral margins of carapace slightly divergent posteriorly.	Postero-lateral margins slightly divergent posteriorly.	Postero-lateral margins slightly convergent posteriorly.	Postero-lateral margins subparallel.
Dorsal surface of carapace in ♂ and ♀ with depressed granules among a minute granulation except for cardiac and intestinal regions which are pitted.	In ♂ carapace only pitted among a minute granulation; in ♀ anterior half of carapace with depressed granules and posterior half with punctae.	In ♂ anterior half of carapace with depressed granules among a minute granulation, posterior half with punctae; ♀ unknown.	In ♂ dorsal surface of carapace evenly pitted among a minute granulation except around inner angle of orbital margin, where some depressed granules are present; in ♀ anterior half of carapace with depressed granules and posterior half with punctae.
Cardiac furrow distinct.	Cardiac furrow shallow.	Cardiac furrow shallow.	Cardiac furrow distinct.
Cervical groove reaches anteriorly 1st lateral tooth.	Cervical groove not discernible anteriorly.	Cervical groove not discernible anteriorly.	Cervical grooves not discernible anteriorly.
Mesogastric region well defined.	Mesogastric region discernible.	Mesogastric region well defined.	Mesogastric region not discernible in its anterior lobe in large ♂.
♂ stridulating ridge with 12-24 thick protuberances, innermost one elongate and finely striated vertically; ♀ one with 20-25 rounded granules.	♂ stridulating ridge with 52 protuberances, its median part thickened in a molar form; ♀ one with 37 uniform granules.	♂ stridulating ridge with 21-28 protuberances, 6-7 innermost ones confluent with one another and provided with fine vertical striae.	♂ stridulating ridge divided by narrow vertical grooves to 64-67 sections, each of which is striated vertically; ♀ one with 47-55 small rounded granules.
Palm of cheliped in ♂ 1.6 times as long as high; in ♀ 1.7.	Palm of cheliped in ♂ 1.4 times as long as high; in ♀ 1.6.	Palm of cheliped in ♂ 1.4 times as long as high; ♀ unknown.	Palm of cheliped in ♂ 1.6-1.7 times as long as high; in ♀ 1.8.
Carpi and propodi of 1st and 2nd ambulatory legs with dense fur in ♂ and ♀.	Carpus and propodus of 1st ambulatory leg with dense fur in ♂.	Carpus and propodus of 1st ambulatory legs with dense fur in ♂; ♀ unknown.	Carpus and propodus of 1st ambulatory legs in ♂ with dense fur; carpi and propodi of 1st and 2nd ambulatory legs in ♀ with dense fur.

For specimens from Shantung Peninsula in N-China, SHEN (1932: 208) stated that "Suborbital crest of male usually with eleven to twelve coarse granules, widely separated. Innermost one elongate and vertically striated, . . ." On the other hand KAMITA (1936: 5) examined specimens from the western coast of Korea and reported that "Stridulating ridge consists of 16-18 protuberances, 3-5 innermost are elongate" (translation from Japanese by the present authors). These descriptions show that the material from the continental side of Asia is not identical to specimens from Japan. Concerning the colouration SHEN described the N-Chinese specimens as "Carapace olive citrone, marbled with maron spots on carapace as well as on dorsal surface of ambulatory legs", which does not hint to *japonica* but to *wuana* from Formosa. For geographical reasons the specimens from N-China and W-Korea are doubtfully included in *japonica*. Examination of material from these areas will bring further clearness. It is safely assumed that this species is distributed from Kyushu to the SW of Tokyo (T. SAKAI 1976).

Zusammenfassung.

Die taxonomische Untersuchung der japanischen und chinesischen Arten der Gattung *Helice* DE HAAN 1835 ergibt: *Helicana* n. subgen. wird für *wuana* RATHBUN 1931 und *japonica* n. sp. aufgestellt; *Helice* (*Helice*) s. str. umfaßt die Arten *tridens* DE HAAN 1835 (mit Unterart *sheni* T. SAKAI 1939), *latimera* PARISI 1918 (syn.: *pingi* RATHBUN 1931), *tientsinensis* RATHBUN 1931 und *formosensis* RATHBUN 1931.

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