

DESCRIPTION OF A NEW SUBSPECIES OF *PISIDIUM TAIWANENSE* FROM TIENCHI, TAIWAN (BIVALVIA: SPHAERIIDAE)

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During a geological survey of Taiwan, on February 16, 1976, living specimens of pill clams were collected from a small pond, called "Tienchi", deep in the mountainous region of southern Taiwan. The shell morphology resembles that of *Pisidium taiwanense* Kuroda, 1941. Yet it is more elongated and the color is straw-yellow instead of pale gray. Thus it is considered as a subspecies of *P. taiwanense*.

Pisidium taiwanense tienchiense Chang and Lin, n. subsp.

Description Shell small, thin, straw-yellow, rounded oval shape, inequilateral. Anterior end of shell more pointed than posterior end which is broadly round and forms an obtuse angle at dorsal margin. Beak moderately inflated and located at $3/5$ of its length from the anterior. Anterior dorsal margin straight and ventral margin roundly curved. Prodissoconch clear. Periostracum thin. Surface sculptured with fine, regular, and some of which are more pronounced than others. Escutcheon slightly convex. Inside of shell yellowish white. Hinge moderately strong with one Δ -shaped cardinal tooth on right valve, two cardinal teeth, of which inner cardinal thickened, somewhat triangular, outer cardinal thin and minute on left valve. Two anterior lateral teeth on right valve, of which the inner tooth is long, arcuate and moderately elevated; outer tooth short and slightly elevated. One elongated spindle-shape anterior lateral on left valve. The right valve has 2 posterior lateral, outer tooth short and slightly elevated; inner tooth long and strongly elevated. The posterior lateral on the left valve is long, spindle shaped and prominently elevated. The pallial line is conspicuous.

Environment The pill clams were dredged from muddy bad at one meter from a permanent body of water 2 meters in depth, 30 by 50 meters in width. No other living organisms were in this pond except for a few water-plants and insect larvae. The quantity of water in the pond may increase during the summer rainy season.

Type locality Tienchi (meaning the Heavenly Pond), a shallow body of water located in the saddle near the southern cross-island highway of

Taiwan in Kaohsiung County at an altitude of 2,300 meters.

Depository Places of depository and measurements of type specimens are as follows:

Holotype	4.83 mm	long,	4.10 mm	high,	2.48 mm	wide;	Taiwan Museum
							No. TMGS - RMo 7804
Paratype							
No. 1.	5.25 mm	"	4.45 mm	"	2.83 mm	"	Senior author's collection
No. 2.	5.30 mm	"	4.50 mm	"	2.98 mm	"	Junior author's collection
No. 3.	5.15 mm	"	4.35 mm	"	2.83 mm	"	Mr. Wu's* collection

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Remarks Specimens studied here are considered a subspecies of *Pisidium taiwanense taiwanense* (Kuroda, 1941) because they resemble the latter in the location of beak, the narrow arcuate anterior margin, rounded posterior end, and the hinge teeth morphology. They are named subspecies *tienchiense* since the valves are more elongated than *P. t. taiwanense*, with a length/height ratio of 1.18 whereas it is 1.15 in *P. t. taiwanense*.

On the other hand, *P. t. tienchiense* resembles *P. subtruncatum* Malm, 1855 from the China mainland and Siberia in shell size and shape, but *subtruncatum* has more elongated (length/height ratio is 1.25), inflated valves and lustrous beak. *P. t. tienchiense* also resembles *P. cinereum* Alder, 1838 from the northern Japan in shell morphology, but *cinereum* has more glossy, evenly pearly gloss surface. Table 1 shows some of the differences in shell characters of these 4 forms.

This subspecies is the second form of *Pisidium* recorded from the island of Taiwan to date. The other form, *P. t. taiwanense* was by Kano from a pool in Mt. Pilu (Hitsuroku-san in Japanese) which is located more than 100 km north of Tienchi at an altitude of about 3,300 meters. The existence of this boreal species in tropical Taiwan perhaps took place while the island was connected to the China mainland, and the separation of the two populations was brought about during the glacial epoch and each subsequently evolved into morphologically distinct forms. Hence *Pisidium* in Taiwan may be considered a relic of the glacial epoch similar to high mountainous insects and plants. On the other hand, zoochores assumption such as dispersal by the migration-birds may also be considerable.

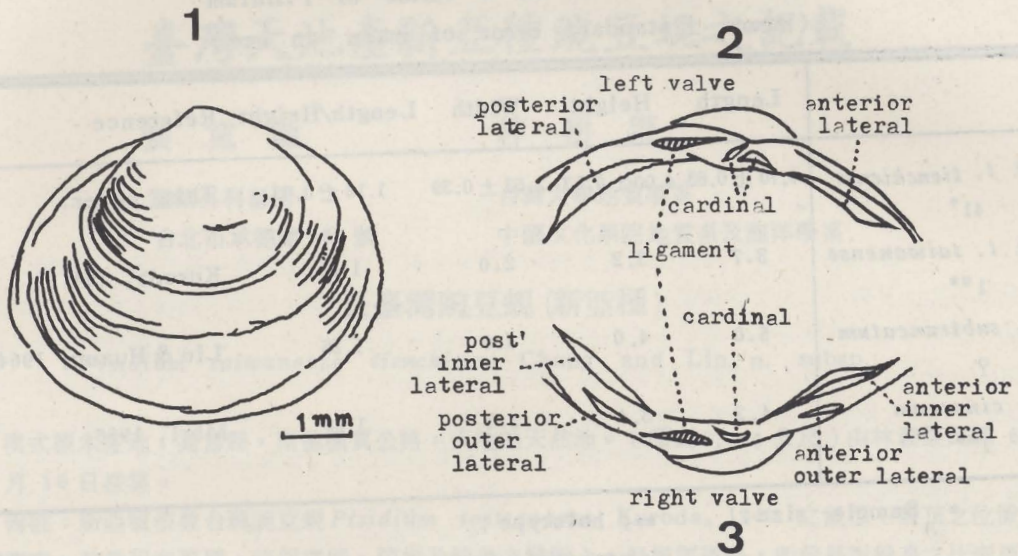
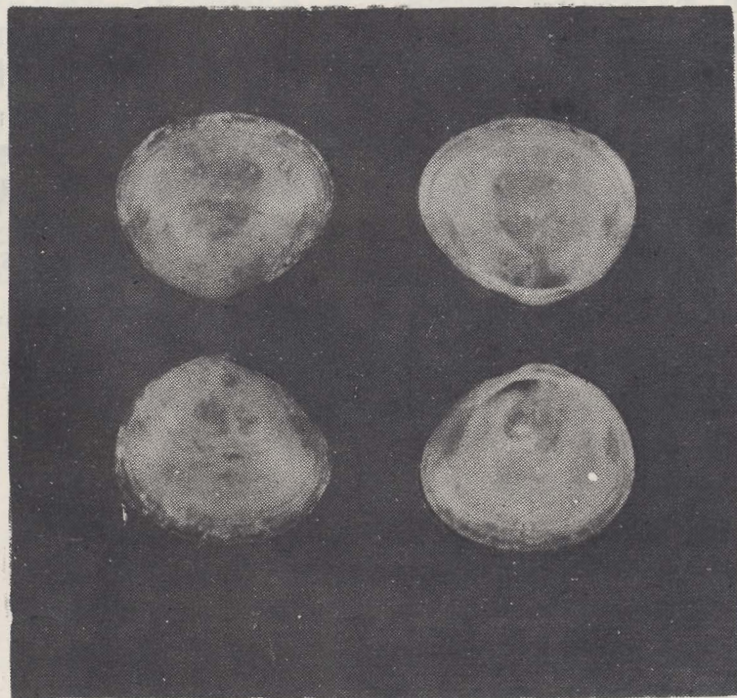


Fig 1: External view of left valve.

Fig 2, 3: Hinge teeth.



Pisidium taiwanense tienchiense Chang and Lin, n. subsp.

Left: External view. Right: Internal view.

Table 1. Shell measurements of 4 forms of *Pisidium*
(mean \pm standard error of mean in mm)

	Length	Height	Width	Length/Height	Reference
<i>P. t. tienchiense</i> 41*	4.70 \pm 0.63	4.00 \pm 0.53	2.52 \pm 0.39	1.18 \pm 0.01	This paper.
<i>P. t. taiwanense</i> 1**	3.7	3.2	2.0	1.15	Kuroda, 1941.
<i>P. subtruncatum</i> ?	5.0	4.0	3.0	1.25	Liu & Huang, 1964
<i>P. cinereum</i> 1**	4.2	3.4	2.3	1.23	Mori, 1938.

* Sample size; **, holotype;

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臺灣天池產新亞種豌豆蜆之記載

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長臺灣豌豆蜆 (新亞種)

Pisidium taiwanense tienchiense Chang and Lin, n. subsp.

模式標本產地：高雄縣，南部橫貫公路，天池站天然池。（標高 2,300 公尺）由林朝榮民國 65 年 2 月 16 日採集。

備註：新亞種很像台灣豌豆蜆 *Pisidium taiwanense* Kuroda, 1941 之殼型（殼頂之位置，前部變窄，前緣強度弧彎，後部廣圓，鉸板及鉸齒之狀況），但橫徑更長，即殼長對殼高之比率更大（前者 1.18，後者 1.15）且殼表呈麥黃色（後者淡灰色）。

自中國大陸，西伯利亞產出的截狀豌豆蜆 *Pisidium subtruncatum* Malm, 1855 與新亞種也很相似其外殼之殼形及大小。但截狀豌豆蜆是外殼橫徑更長更膨脹，殼頂有光澤。在日本北部棲息的灰色豌豆蜆 *Pisidium cinereum* Alder, 1838 也是與本新亞種頗似其外形及大小，但灰色豌豆蜆之殼表有更明顯之光澤甚者呈珍珠光澤。

這新亞種是自台灣第二次發現的豌豆蜆。第一次發現的豌豆蜆是台灣豌豆蜆。該種之產地是台灣山脈北部高頂部畢祿山（標高 3,300 公尺）。兩者都是自標高 2,000 公尺以上之高山域之天然池發現。但兩者產地遠離 100 公里以上。這樣北方系之豌豆蜆在熱帶亞熱帶區之台灣棲息之原因是因往昔一段時期台灣與中國大陸相連時，自這陸橋傳播到台灣來的。因台灣有冰河然後氣候變溫暖的關係，這類豌豆蜆被隔離在各山城，演化其型態及其產地只限在寒冷之高山。和台灣現生之高山性昆蟲及植物一樣，台灣之現生豌豆蜆是可以謂冰河時代之一種遺物（relic）。

由於上述之豌豆蜆之分布也可能有因候鳥傳播之作用。但產地只限在標高 2,000 公尺以上之高山域天然池，而且該天然池中未曾發現過任何被候鳥傳播之其他生物相。因此由候鳥作用的動物傳播說法可能性極微。