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HARDELLA ISOCLINA DUBOIS REDESCRIBED

by

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In 1908 Prof. E. Dubois cited and very briefly diagnosed a new species of emydine turtle, *Hardella isoclina,* from the Trinil Beds in Java. The very fine unique type shell has never been figured or fully described, the generic assignment appears to be incorrect, and the original diagnosis is insufficient. Prof. Boschma and Dr. Brongersma of the Rijksmuseum van Natuurlijke Historie in Leiden have, as custodians of the Dubois Collection, very generously offered me the opportunity of redescribing this form.

The fossil is a very distinct species and a very noteworthy component of the Trinil fauna but even after much study and comparison it proves impossible to refer it with confidence to any known genus, and in the absence of any knowledge of the characters of the skull no new genus can be satisfactorily defined. The Trinil form appears to resemble most closely the living species *mutica* from southern China, Formosa, Hainan, and Japan, and since *mutica* is currently though questionably assigned to the genus *Clemmys* it will be convenient for the present to refer the Dubois species to *Clemmys* with a query:

Clemmys? **isoclina** (Dubois)

Diagnosis: an emydine resembling "*Clemmys*" *mutica* but differing in greater size, in having the posterior margin of the carapace not at all serrate, in having the gular region not produced and the inguinal scute larger.

Type: Dubois Collection No. *2722*, an almost perfect shell, lacking only the anal region of the plastron.

Type locality: Kedoeng Panas, Java.

Horizon: Pleistocene, Trinil Beds.

Referred material: Dubois Collection No. *2703*, anterior and posterior plastral fragments from the same locality as the type.

First (and only previous) citation in full (Dubois, 1908, p. 1270):

„Die Süsswasserschildkröte *Hardella isoclina* n.sp. unterscheidet sich von *H. Falconeri* der Siwalik-Schichten, sowie von der im Stromgebiet des Ganges und Indus lebenden, jener nahestehenden, *H. Thurgi,* namentlich durch die hinten und vorn fast gleich geneigte Profillinie des Rückenpanzers, die nicht geradlinige Sutur zwischen Postgularia und Pectoralia des Plastron und die undeutliche Areolae auf den Rückenpanzer. Die fossile javanische Art nähert sich mehr der Siwalik-Art durch die höhere Wölbung des Rückenpanzers und die weniger ausgedrückte Kielform von dessen vorderem Teile, sowie durch die glockenförmige Umrisslinie des ersten Vertebralschildes."

Revised Description:

Carapace:

Straight length: 308 mm. Broad oval, the margins not serrate or reverted, the nuchal region slightly indented. Moderately convex, equally declivous in front or behind, without vertebral or lateral keels.

Dorsal scutes: Nuchal relatively broad, wider posteriorly. The first vertebral much narrower than the first marginals plus nuchal, subhexagonal, longer than broad, with the posterolateral margins bowed out, so that the scute is wider posteriorly and in total effect bell-shaped. Vertebrals 2 to 4 subquadrate, convex laterally, about as long as broad, narrower than the corresponding costals. Vertebral 5 subhexagonal, its greatest width a little posterior to the middle of the scute, wider than long. Costomarginal sulcus below the pleuroperipheral suture except in the pygal region. First marginals very large, much wider than long.

Bones of the dorsal shell: Nuchal half again as broad as long, subhexagonal, indented anteromedially. First neural nearly quadrate, longer than broad. Neurals 2 to 8 hexagonal, short-sided in front, somewhat broader than long. First suprapygal trapezoidal, widest behind. Second suprapygal almost as wide as long, symmetrically hexagonal. Pygal small, wider than long, deeply indented posteromedially. Pleurals 2, 4, 6, 7 and 8 narrower proximally than distally. Pleural 3 slightly and pleural 5 markedly wider proximally than distally. Bones not heavy or thick.

Plastron:

General shape: Anterior lobe short, shorter than bridge, its sides nearly parallel and the gular region rounded-truncate. Posterior lobe longer, about as long as bridge, with nearly parallel or gently incurving sides and a shallowly indented anal margin. The body of the plastron not set off by a sharp angle from the bridge.

Scutes: Gulars short, transversely extended, significantly broader than

long. Humerals relatively long, occupying most of the anterior lobe. Pectorals rather narrow, expanding a little toward the axillary region on each side. Femorals longer than abdominals. Anals transverse, their median portions not much anterior to their lateral portions. F > abd > h > p > g; an? Inguinal scute moderate but not reaching femoral. Axillary smaller.

Bones: Entoplastron as wide as long, well in front of the humeropectoral sulcus. Gular region without development of a gular lip. Bones not heavy or thick.

Discussion. In spite of the splendid preservation of the type the Dubois species *isoclina* has been difficult to place generically. Turtle genera, and especially emydine genera, are founded upon combinations of shell and skull characters, and lack of either of these critical elements makes the task of generic placement laborious and insecure. This task is made still more difficult by our lack of adequate knowledge of many east Asiatic forms. The generic assignment of some living species (*mutica* is an example) is still doubtful, and a renewed investigation of these forms, when it becomes possible, may result in considerable revision of present conventional assignments and even of our basic conceptions of emydine genera.

However, it is possible to determine with certainty that *isoclina* cannot belong to certain groups of genera. Most importantly it cannot belong to the typical diving turtles of which *Hardella* is one. Dubois was not wrong in finding points of similarity between *isoclina* and *Hardella thurgi,* but in one critical respect *isoclina* is quite unlike the diving turtles. In *isoclina* the axillary and inguinal buttresses are very weak, whereas in *Hardella* and the genera most closely related to it these buttresses are extraordinarily strong, almost dividing the shell into compartments.

Fortunately, the very weak buttressing of *isoclina* taken in conjunction with the position of the entoplastron anterior to the humeropectoral sulcus and the absence of appreciable vertebral or lateral keeling of the shell narrows the area of search for relatives of the Dubois species. On one or more of these grounds we may at once disregard the typical species of *Clemmys* and the derivatives of the typical members of that genus, *Geoemyda* etc. as well as *Annamemys, Ocadia, Siebenrockiella, Orlitia, Malayemys, Geoclemys,* and *Chinemys,* and for each of these other characters support their omission from consideration.

Likewise, the American emydine genera *Pseudemys, Chrysemys, Graptemys, Malaclemys, Deirochelys, Emydoidea* are not only geographically improbable but are ruled out by one or more features in each case: e.g. relatively strong buttresses and surface sculpture in *Pseudemys,* the strong vertebral keel in *Graptemys* etc.

At one time it was thought that *isoclina* might be referred to *Morenia* or even be an intermediate between *Morenia* and *Hardella.* Such an intermediate would be welcome since the two living species of *Morenia* have the buttresses as weak as in *isoclina* but in skull structure are so strikingly

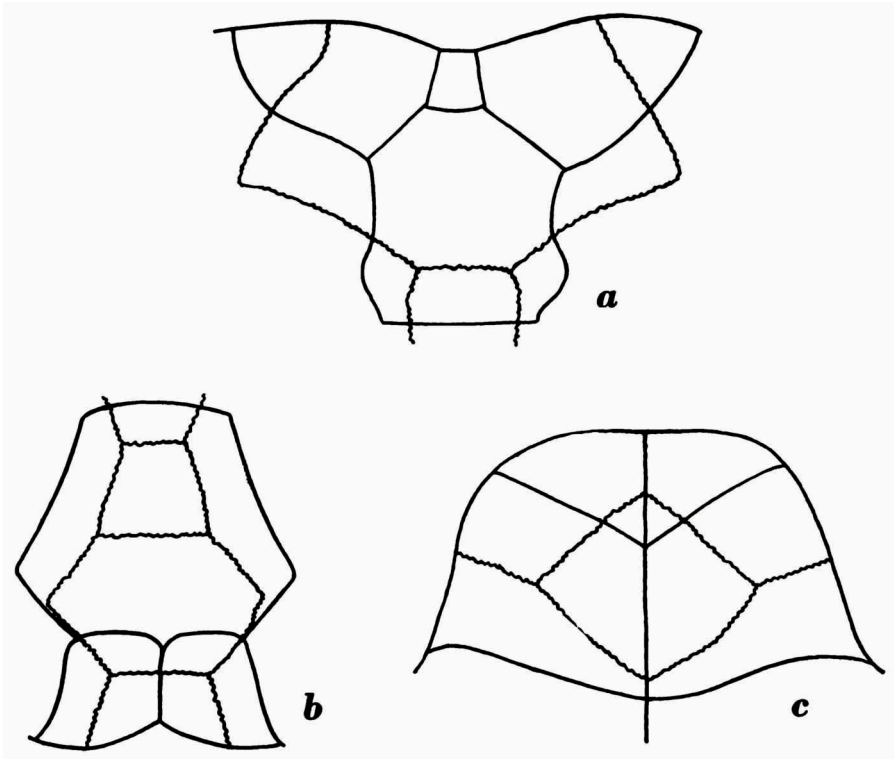

Fig. 1. *Clemmys? isoclina* (Dubois). *a,* nuchal region; *b,* pygal region; *c,* anterior lobe of plastron.

similar to *Hardella* and its group in the extreme secondary palate and the strong triturating ridges that they are universally considered related to the *Hardella* series. However, a check of all comparable characters has left no doubt that *isoclina* differs even more from both species of *Morenia* than it differs from *Hardella.*

It is thus by elimination that we arrive at *"Clemmys" mutica* as the possibly closest relative of *isoclina.*

Unhappily *C. mutica* is a rather rare and certainly a poorly understood form and one which appears (Nakamura, 1934), to vary geographically in characters commonly (and with much reason) considered generic. A generic

TABLE I

isoclina	*Hardella thurgi*	*Morenia ocellata*	*"Clemmys" mutica*
a feeble nuchal notch	a feeble nuchal notch	no nuchal notch	a feeble nuchal notch
no carapacial keels	an interrupted vertebral keel	an interrupted vertebral keel	a vertebral keel, sometimes feeble
nuchal scute wider behind	nuchal scute wider behind	nuchal rectangular	nuchal wider behind
first vertebral much narrower than nuchal plus first marginals	first vertebral much narrower than nuchal plus first marginals	first vertebral about as wide as nuchal plus first marginals	first vertebral much narrower than nuchal plus first marginals
vertebrals narrower than costals	vertebrals much narrower than costals	vertebrals narrower than costals	vertebrals narrower than costals
posterior margin not serrate	posterior margin feebly serrate	posterior margin not serrate	posterior margin feebly serrate
pygal indented	pygal not indented	pygal not indented	pygal indented
gulars rather transverse	gulars rather transverse	gulars rather long	gulars rather long
gulars not produced	gulars not produced	gulars somewhat produced	gulars somewhat produced
inguinal moderate	inguinal large	inguinal large	inguinal small
Femoral median sulcus longer than that of abdominal	Abdominal longest, femoral next to shortest	Abdominal or pectoral longest	Abdominal subequal to femoral
neurals broader than long	neurals longer than broad	neurals broader than long	neurals about as broad as long
pleurals differentiated	pleurals not differentiated	pleurals not differentiated	pleurals tending to be differentiated
buttresses very weak	buttresses extremely strong	buttresses very weak	buttresses very weak
carapace length 308 mm	500 mm	210 mm	150 mm

name *-Cathaiemys-* has been proposed for *mutica* by Lindholm (1931) in a short and rather casual note and on grounds that seem insufficient (see again Nakamura, 1934). The species is almost certainly out of place in *Clemmys,* but a convincing definition of the genus *Cathaiemys* is still not available.

In this situation any generic placement of the Dubois species must be declared in the most emphatic terms to be provisional, with the final decision on this point deferred until the fossil species as well as its apparent relatives are better known and until generic boundaries in the Emydinae are better understood.

In addition to the shell redescribed here much other turtle material has been recovered from the Trinil Beds. In 1911 Jaekel described and figured this material, naming two species of *Batagur* (*B. siebenrocki* and *B. signatus*), two of *Chitra* (*C. selenkae* and *C. minor*) and one species of *Trionyx* (*T. trinilensis*). I have seen the material on which these species are based, and while none of it is nearly as good as the type of *C. isoclina* and most of it is very unsatisfactory, the generic assignments and presumed relationships are probably close to the truth. All of this much more abundant material points to affinities with forms which are Indian or Burmese in distribution in the Recent fauna. *Isoclina,* if its affinities are really with *mutica,* introduces an apparently Chinese element into the Trinil turtle fauna.

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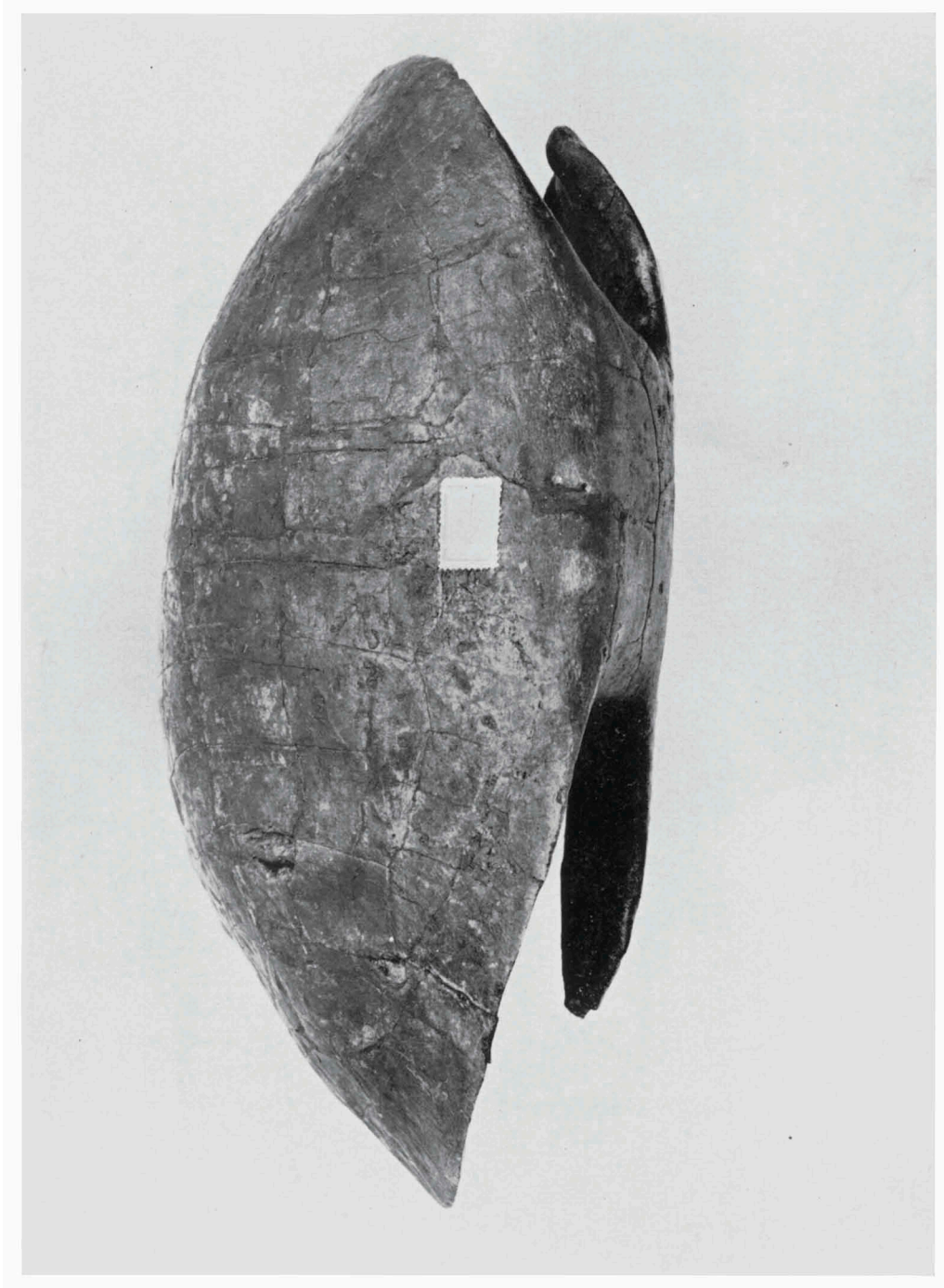

Clemmys? isoclina (Dubois). Lateral view of type shell. × ½.

Clemmys? isoclina (Dubois). Dorsal view of type shell. × ½.

Clemmys? isoclina (Dubois). Ventral view of type shell. × ½.

Clemmys? isoclina (Dubois). Dorsal (internal) view of referred plastral fragments. Dubois Collection No. 2703. × ¾.