

# A MIOCENE FOSSIL FROG FROM SHANTUNG.

BY

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Among a large collection of plants, insects, fishes, turtles and mammals recently collected by the author near Lingchühsien, Shantung, a well preserved fossil frog and numerous impressions of tadpoles are of a particular interest, and require a special description. The specimens were found in the lower shaly part (paper-shales) of the Miocene (?) series of Shanwang, N. Shantung. (cf. C. C. Young, On the Cenozoic geology of Itu, Changlo and Linchü Districts, Bull. Geol. Soc. China, Vol. XV p. 171).

## DESCRIPTION

Family RANIDÆ

Genus *Rana* L.

*Rana basaltica* Young (sp. nov.)

The print and counterprint of the fossil are beautifully preserved on two pieces of papyraceous shale, the impression of a small fish (*Pseudorasbora macrocephala*) also being seen on the fragment where the leg of the frog is missing. The general outline of the body is clearly indicated in brown on the light colored shale, and the bones distinctly marked in the body by a darker coloration.

The skull has a general triangular shape, the anterior-posterior length being decidedly shorter than the maximum breadth of the posterior part of the skull. The more delicate bones are slightly damaged; but on the whole the skull is well preserved. Traces of small teeth can be observed.

There are 9 vertebrae, the two first ones somewhat damaged or covered by the pectoral girdle. Diapophyses almost completely preserved.

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As in the recent species of this genus, the second vertebra (that is the first after the atlas) has the strongest diapophyses. On account of a slight shifting of the vertebrae, the shape of the neural spine is somewhat distorted on the specimen.



Fig. 1. *Rana basaltica* Young (sp. nov.). The entire body in ventral aspect. The fresh impression, dotted; bony skeleton, solid lines. Cl. Clavicula, Co. Ceracoid, Se. Scapula.  $\times 2$ .

*Pectoral girdle* incompletely preserved. The supra-scapular bone seems to be indicated only by its proximal end, where it connects with the scapula. Both scapulae and coracoid are preserved, and in natural position. The clavicularae are also probably represented by two slender bones (fig. 1) in front of the coracoid, unless these pieces correspond

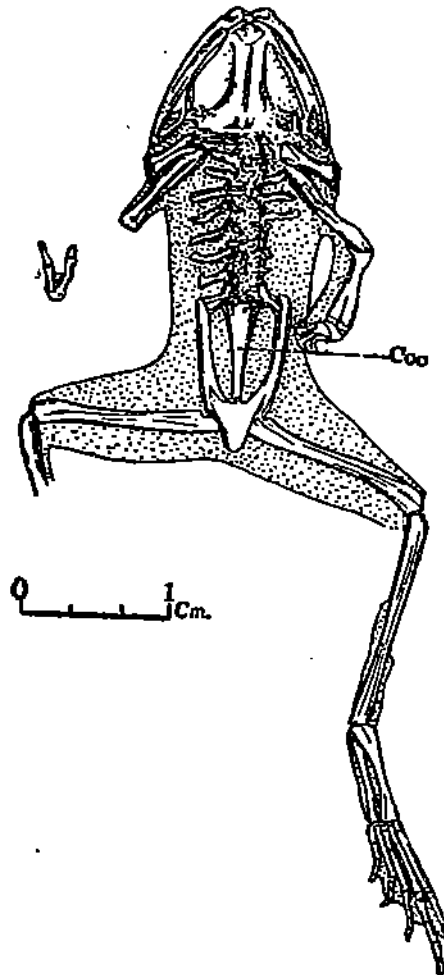


Fig. 2. *Rana basaltica* Young (sp. nov.). Coc. Coccyx.  $\times 2$ . Other explanations are in text figure 1.

to some disapophyses of the vertebrae. The epicoracoid, omosternum and sternum can not be traced clearly amongst the other bones.

The *fore-limbs*, with exception of a few phalanges, are all represented on the print or on the counterprint. No appreciable difference with those of the living Asiatic species, with this exception perhaps, that the radio-ulna is proportionally longer.

The most interesting part of the fossil is the *pelvic girdle*, which, together with the coccyx, is well preserved. This part of the skeleton is characterized by a short and massive general architecture. The anterior maximum breadth of the pelvic girdle is about the same as in *R. asiatica*, yet its total length is shorter by more than one half.

*Hind limbs* perfectly preserved, especially the left tarsus. Even the outline of the web is distinct. The web does not reach the tip of the phalanges, approaching the condition found in *Rana agilis*. The tibio-fibula is a little longer than the femur. The total length of both together is shorter than the body length.

Measurements:	<i>Rana basalica</i>	<i>Rana asiatica</i> (Choukoutien)	<i>Rana asiatica</i>
Length of the head.....	11.2 mm	15 mm	16 mm
Max. posterior breadth.....	9.5 mm	15 mm	16 mm
Length from the tip of the skull to the posterior end of the pelvic girdle (including the outline of the body).....	29 mm	49 mm	42 mm
Length of humerus.....	29 mm	14.5 mm	10 mm
Length of radio-ulna.....	5.3 mm	10 mm	9.5 mm
Length of the pelvic girdle...	10 mm	18 mm	17.5 mm
Anterior breadth of the same	7 mm	7 mm	8 mm
Length of femur.....	12.5 mm	20 mm	20.5 mm
Length of tibio-fibula.....	14.5 mm	22.5 mm	21.5 mm
Length of the foot.....	17.5 mm	34 mm	31 mm

*Tadpoles* There are 8 tadpoles present in our collection. Some are well preserved. The eyes and the outline of the impression are clearly shown. However it is difficult to define the detailed structure. Length, 26 mm. Maximum breadth of the head, 7 mm.

#### COMPARISONS AND CONCLUSIONS

The closest living form which we can compare with our fossil specimen is *Rana asiatica*. And yet, as shown by the above description and measurements, several important differences can be easily traced between the two forms. Although smaller than *R. asiatica*, the Miocene form has relatively thicker limb bones, its shorter size being largely due to the shortness of its massive pelvic girdle. In addition, its skull, longer than wide, is more pointed. On the basis of these differences, we attribute our specimen to a new species, *Rana basaltica*, this name referring to the particular condition of the site of the discovery. It is interesting to observe here that, in the intertrappean blue shales (Cretaceous?) of India, near Bomay, fossil frogs and tadpoles occur in exactly the same conditions of preservation as in Shantung.

Only three fossil *Rana* were known so far in China: *Rana hipparionum* Schlosser<sup>1</sup> from Ertemte, Chahar (limb bones), and *Rana nigromaculata* and *R. asiatica* from Locality 3 of Choukoutien (limb bones). Three of them are geologically younger than our form. The stratigraphical distribution of the Chinese fossil *Rana* may be summarized in the following list:—

Pleistocene	<i>Rana asiatica</i> Bedrigh <i>Rana nigromaculata</i> Hallawell Loc. 3, Choukoutien.
Pliocene	<i>Rana hipparionum</i> Schlosser. Ertemte.
Miocene	<i>Rana basaltica</i> Young. Shanwang.

1 Schlosser, M. 1924. Tertiary Vertebrates from Mongolia. Pal. Sin., Ser. C, Vol. I, Fasc 1, p. 96.

2 Bien, M.N. 1934. On the fossil Pisces, Amphibia and Reptilia from Choukoutien Localities 1 and 3. Pal. Sin., Ser. C, Vol. X, Fasc. 1, p. 12.



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**Explanation of  
Plate I**

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PLATE I.

Fig. 1 and 1a. *Rana basaltica* Young (sp. nov.). Seen from the original slab.  $\times 2$ .

Fig. 2. Tadpole in dorsal aspect.  $\times 2$ .

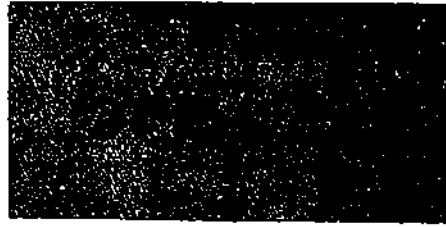


*Young:—A Miocene Fossil Frog from Shantung*

Plate I.



1a



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