

ON THE NEW FINDS OF FOSSIL EGGS OF *STRUTHIO*
ANDERSSONI LOWE IN NORTH CHINA WITH
REMARKS ON THE EGG REMAINS FOUND
IN SHANSI, SHENSI AND
IN CHOUKOUTIENS

by

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In the Museum of the Geological Survey only a single complete specimen of a fossil egg of *Struthio* is exhibited. This specimen came from Ssushui (泥水) and it was described briefly by J. G. Andersson in his "Essays on the Cenozoic of Northern China."¹ The other remains of *Struthio* eggs described in that paper are either abroad or are recorded as being in private possession. Although ten years have passed since the publication of Andersson's paper no further discoveries of these interesting fossils have been reported. Quite recently, however, two new localities have yielded specimens and these new records are described in the following notes.

1. FIND AT YOUYÜHSIEN

A few months ago a nearly complete egg was found at a village called Michiaochuang (米家莊) south of Youyühsien (右玉縣) in North Shansi (marked 19 on the map). The specimen was brought to the Geological Survey by a student who had obtained it from the natives. It was found, according to the information given to the student, in the loess about three meters below the surface. Parts of the surface of the shell are still covered by a gray and rather hard concretion. The inner surface of the egg is pure white and the broken edge has a perfectly fresh appearance, showing that the damage was evidently due to the

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1 Mem. of the Geological Survey of China, Ser. A, No. 3, p. 62, 1923.

For a more complete revision of the Chinese ostrich eggs, a study of the rich Loessic and Pontian material kept in the F. Licent's Museum in Tientsin should be undertaken.

careless excavation of the egg by the natives. The specimen is now in the Museum of the Geological Survey.

2. FIND AT SHINGTANGHSIEN.

Another complete egg, found in the vicinity of Chenchuangchen (陳莊鎮) in Shingtanghsien (行唐縣), Northwest Hopei (marked 20 on the map), was brought to light quite recently. Through the kindness of Mr. H. Shang (尙騰) this specimen was brought to the notice of Dr. W. H. Wong, the Director of the Geological Survey of China. This specimen is beautifully preserved and is broken only over an area of about 3 square centimeters.

The inner surface is still covered by a deposit of grey loess: it is possible therefore that the breaking of the egg occurred some time ago. As shown in the following table of dimensions this egg is characterized by its very large size and its marked elongation.

This specimen is in the private collection owned by Mr. H. Shang of Peiping.

DIMENSIONS.

In order to convey an idea of the size of these specimens the measurements of all three are recorded and the dimensions of a modern specimen of the egg of *S. camelus* are included for comparison.

TABLE I.

	Spec. of Ssushui	Spec. of Youyühsien	Spec. of Shingtang- hsien	<i>S. camelus</i> (recent)
	(mm)	(mm)	(mm)	(mm)
Max. diameter from pole to pole	175	186	193	153
Max. diameter of the equator	144	153	155	127
Difference of the above diameters	31	33	38	26
Major circumference	493	523	546	465
Equatorial circumfe- rence	443	478	481	411
Difference of the two measurements	50	45	65	54
Thickness of the shell	—	2.1	2.2	—

In Andersson's paper on the Occurrence of Fossil Remains of Struthionidae in China there are recorded the dimensions of eggs from the Loess of eighteen different localities (ibid. p. 68).¹ Comparing the dimensions of the two new eggs with Andersson's figures, those of the specimen from Youyihshien nearly approach the maximum, while those of the Shingtanghsien egg considerably exceed it. This fact suggests the possibility that a wider range of material might show that variability was much greater than has been hitherto supposed.

REVISION OF DETERMINATION.

Andersson considered all the eggs from the Loess of the eighteen localities as belonging to *Struthiolithus chersonensis*. Lowe² however in a recent study, based mainly on Andersson's material, has argued for the creation of a new species of the genus *Struthio* for which he proposes the name of *S. anderssoni*.

Judging from Lowe's description, and taking the stratigraphical evidence into account, the two new specimens should doubtless be assigned to this species.

NOTES ON THE STRATIGRAPHY

Both Andersson and Lowe assumed that all the localities from which the eggs of *S. anderssoni* have been recorded belong roughly to the Loess. This assumption could only be maintained by a somewhat broad and almost obsolete use of the term Loess. One result of our recent researches has been the definite establishment of intermediate formations between the Hipparion Red Clays and the true grey Loess. It is very difficult, from the rather indirect information, to determine precisely the level from which Andersson's specimens actually came. But using his descriptions we may say that the so-called "Reddish Loess" is not true Loess in the proper sense of the term, but is the equivalent of what is now termed the Reddish Clays or Loams which may themselves be further sub-divided into several sub-zones. A considerable number of Andersson's specimens (especially 1, 14 etc.) therefore came, not from the true Loess, but

1) ibid. pp. 53-77; see also the measurements given by Lowe (ibid. p. 37).

2) Lowe, P.R. Struthious remains from China and Mongolia; with descriptions of *Struthio wimani*, *Struthio anderssoni* and *Struthio mongolicus* spp. nov., Pal. Sin., Ser. C, Vol. VI, Fasc. 4, 1931, p. 23.

Some good specimens described by P. R. Lowe have just been returned to the collection of the National Geological Survey of China. March 1933.

from the Reddish Clays. Since this is so, it can no longer be claimed that *S. andersoni* is an index fossil of the Loess since it is representative of both the Lower and Middle Pleistocene, if all the eggs so far known are referable to a single species.

NOTES ON SOME EGG FRAGMENTS FOUND IN SHANSI AND SHENSI

In the course of the geological survey made by Père Teilhard and myself in Shansi and Shensi in 1929¹ some fragments of *Struthio* eggs were collected in several different localities. The age of the sites from which these fragments were collected was determined as belonging both to the Hipparion Clay and to the Sammenian Reddish Clay.

The thickness of all these fragments is given in the following table:

TABLE II.

Loc. No. of Spec.	Hofen (Loc. 1) (higher zone)	Lutzekou (Loc. 3) (Hipparion beds)	Hoshan (Loc. 5) (Red Clay & Reddish Clays)	Maying- san (Loc. 9) (Red & Reddish Clays)	Sheumu- san (Loc. 12) (Red Clays)	Shih-te- san (Loc. 16) (Red & Reddish Clays)	Hsu- chiapin (Loc. 17) (Reddish Clays)
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
1	2.1	1.9	2.1	2.2	2.1	1.9	2.
2	—	1.9	2.3	2.2	2.4	1.9	—
3	—	2.2	2.3	2.3	2.5	2.0	—
4	—	—	2.5	2.3	2.5	2.4	—
5	—	—	—	2.5	2.6	—	—
6	—	—	—	2.5	2.7	—	—

According to Lowe the eggs of all three species of *Struthio* may be distinguished by the thickness of the shells alone. The Pontian form—

¹ Teilhard and Young, Preliminary observations on the pre-Loessic and post-Pontian formations in Western Shansi and Northern Shensi. Mem. Geol. Survey China, Ser. A, No. 8, pp. 1-45, 1930.

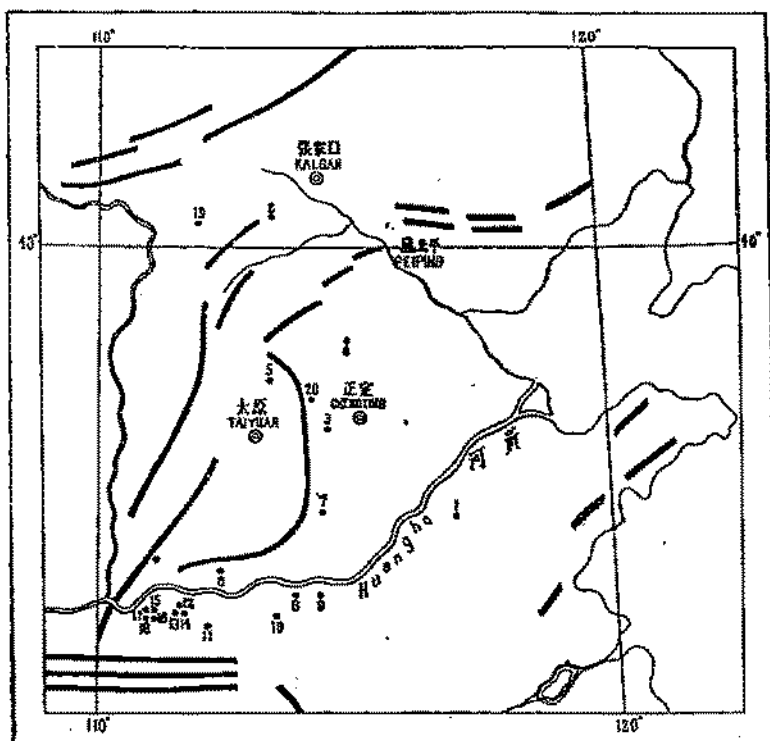
S. wimani—is said to have an average thickness of 2.6 mm, whilst that of the geologically younger *S. anderssoni* is 2.2 mm and of *S. mongolicus* of the Eocene fauna is 1.9 or even less. If Lowe's findings are correct, it would seem that, judging from the measurements recorded above, we have all three species represented among these fragments. Using this criterion, the specimens from Localities 1 and 17 belong to *S. anderssoni*; and both *S. wimani* and *S. anderssoni* are represented in Localities 5 and 9 and it would not be surprising to find both in these localities in which both the Red Clay and the younger Reddish Clays are present. The other three localities however present some difficulties since in Localities 3 and 12 no true deposits of the Reddish Clay have been observed and yet there are shell fragments of 2.1 mm and 2.2 mm thickness which assigns them to *S. anderssoni*. The two measurements of 1.9 mm from Localities 3 and 16 are also anomalous, but may be explained by assuming the eggs to be those of *S. mongolicus*. The present material is not sufficient to furnish the basis of a reliable statistical study to test the value of this method of distinguishing the three species by the thickness of the shells alone. It may be noted, however, that in our table of measurements the figures appear to form rather a continuous series (see especially Localities 9 and 12) without any clear-cut line of division between the groups.

THE STRUTHIO EGG REMAINS FROM CHOUKOUTIEN.

In Locality 1 at Choukoutien fragments of *Struthio* eggs were found with some frequency mainly in the upper levels of the deposit. Some of the fragments are entirely burnt. A large number of the specimens are markedly worn and have the inner vertical layer lost. Among one hundred unworn fragments collected from various parts of the deposits the thickness varies from 1.9 mm to 2.3 mm; there being 6 specimens with a thickness of 1.9 mm, 20 with 2.0 mm; 25 with a thickness of 2.1 mm, 33 with 2.2 and 13 with 2.3. The range of variation clearly shows that we are here dealing with the species *S. anderssoni*.

CONCLUSIONS.

In conclusion it may be briefly stated that:—(1) in addition to the localities already known for *S. anderssoni*, two new sites have been discovered extending the geographical distribution of this remarkable fossil (see map, Fig. 1)



Text fig. 1. Sketch map of the lower Huangho district showing the main localities where fossil eggs of *Struthio anderssoni* have been found. 1—18, localities reported by Andersson. 1. Shantung, Changchiuhsien, Shawantsun., 2. Chahar, Hsinghsien, Yaochiaochuang., 3. Hopei, Chinghsinghsien, Chinghsing coal mine., 4. Hopei, Chueyanghsien, K'ouan. 5. Shansi, Wutaihsien, Yangtaichuang., 6. Shansi, Pingluhsien, Liangchiat'an. 7. Honan, Wuanhsien., 8. Honan, Chenhsien., 9. Honan, Hoyinhsien, Hanwangcheng., 10. Honan, Sunahhsien, Monshan., 11. Honan, Kunghsien, Chaokou., 12. Honan, Hsinanhsien, Tsaichiachuang. 13. Hsiaokouyue, 14. Tunghuanguueyuan., 15. Honan, Mienchiuhsien, 16. same district Fengmingpo., 17. same district, Kuoyekou., 18. same district, Yangshaotsun., 19-20, the two new localities: 19. Shansi, Youyuehsien, Michiachuang., 20. Hopei, Shingtanghsien, Chenchuangchen. (The names are a little modified according to the latest geographical names used in China.) The fragmentary finds in Shansi and in Shensi (see p. 148) are not reported in this map. Scale about 1:1200,066.

1). (2) In view of the newer knowledge of stratigraphy, the age of *S. anderssoni* cannot be considered as being only Loessic. It would appear that *S. anderssoni* was already living in the Sanmenian period, became more abundant in the Choukoutien period (equivalent to the upper Reddish Clay) and was extinct at the end of the Loessic period, if the finds at Yangshao are secondary (see the discussions of Andersson and Lowe, loc. cit.). (3) The numerous specimens of fragments of eggshells found in Shansi and Shensi and now preserved in the Cenozoic Laboratory of the Geological Survey of China may represent all three species (two of Pliocene and one younger) described by Lowe if his method of making specific determinations by the thickness of the shell is reliable. (4) the eggshells found at the *Sinanthropus* site at Choukoutien, judged by Lowe's criterion, also belong to *S. anderssoni*.