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TWO NEW STROBILOPIDS FROM THE PLEISTOCENE OF THE HIGH PLAINS

BY TONG-YUN HO AND A. B. LEONARD

In the summers of 1958 and 1959, studies on the Pleistocene geology and molluscan faunas of the White (Blanco) River area in northwestern Texas were carried out by us. In the course of these studies, numerous fossil shells of *Strobulops* of problematical taxonomic status were found associated with other pulmonate mollusks in fluviatile deposits ranging in age from Kansan to Wisconsinan. About 200 specimens of *Strobulops* have been obtained from the White River area. We were unable to assign these shells to any known species owing to their consistent characteristics intermediate between extinct *S. sparsicostata* F. C. Baker (1938:127) and living *S. texasiana* Pilsbry and Ferriss (Pilsbry, 1948:856). For these reasons and because of their wide geographic distribution and stratigraphic range, it seems best to propose a new name for these fossil shells. Series of several Pleistocene *Strobulops* from the post-Nebraskan of Central High Plains were restudied. Those series of *Strobulops*, which had been confused with *S. sparsicostata*, appear to belong to the new species described here.

STROBILOPS LONSDALEI, new species. Plate 6, figs. 1-2; text figs. 1-2

Diagnosis: Shell large for *Strobulops*, having trochiform outline; decidedly angulate last whorl; $5\frac{1}{2}$ to 6 convex whorls sculptured by 40 to 50 moderately spaced, moderately thickened, oblique ribs passing over base without diminishing; weak and nodose infraparietal lamella.

Holotype: Catalogue number 12180, University of Kansas Museum of Natural History, obtained by A. B. Leonard and Tong-yun Ho, June 9, 1959. Original number TYH 34.

Description of holotype: Shell large, trochiform; whorls 6 in number, moderately convex, slowly increasing in size; last whorl decidedly angulate; base broadly rounded; first $1\frac{1}{2}$ whorls finely granulose, remaining whorls covered by moderately spaced, moderately thickened ribs passing over base without reduction in size, except for those immediately in front of aperture; diameter

of umbilicus equivalent to $\frac{1}{8}$ greater diameter of shell; aperture lunate, expanded, having moderately thick parietal callus and peristome; parietal lamella nodose, high, emerging to edge of parietal callus and penetrating about $\frac{3}{4}$ of a whorl inward; interparietal lamella nodose, weak, shortly emerged and penetrating as deep as parietal lamella; infraparietal lamella nodose, weak, shortly emergent and penetrating as far as parietal lamella; columellar lamella weak; first basal fold moderate, triangular; second basal fold high, broadly triangular, nearly as long as first basal fold; third basal fold low, about $\frac{1}{2}$ length of second basal fold; fourth and fifth basal folds low, each approximately twice length of third basal fold; palatal fold low, longer than fifth basal fold (internal anatomy from paratypical shell).

Paratypes: Many variations occur among more than 200 paratypes in the length, thickness, and number of baso-palatal folds, and in the development of ribs. The baso-palatal folds in most shells are 5 in number but in a few specimens a small fold is present between the third and fourth basal folds. The inter- and infra-parietal lamellae are extremely weak and may become discontinuous in some examples. The number of ribs ranges from 40 to 50. In some examples, a faint riblet is between major ribs. The ribs on the base may become weak on the last half of the base or near the umbilicus in some shells; as a rule they are conspicuous on last half of base.

Comparisons: *S. lonsdalei* is clearly distinguished from *S. sparsicostata* (Plate 6, figs. 5-6; text figs. 4-5) by having ribbed base, weak nodose infraparietal lamella, and fine and narrowly spaced oblique ribs, always more than forty in number. The denticles as a group are always weaker than are those of *S. sparsicostata*. The parietal lamellae are nodose in *lonsdalei*, but most of them are always smooth in *sparsicostata*. The palatal fold is generally present in *lonsdalei*, but it is absent in some specimens of *sparsicostata*.

The shell of *S. lonsdalei* differs from that of *S. texasiana* (see Pilsbry, 1948, fig. 464:5-11) in being large and trochiform instead of small and dome-shaped. The last whorl is subangulate or rounded in *texasiana*, whereas it is decidedly angulate in *lonsdalei*. The ribs, which are always more than 50 in number in *texasiana*, are always less than 50 in *lonsdalei*. The ribs are also more widely spaced and coarser in *lonsdalei* than in *texasiana*. The internal structure of the shell of *lonsdalei* is also different

from that of *texasiana*. The latter has a tongue-shaped (blunt-topped) first basal fold, and high, rather flat-topped second basal fold, while in the former both the first and second basal folds are triangular in shape with subacuate tips. Unlike *texasiana*, *lonsdalei* has a low second basal fold and intraparietal lamella.

The comparisons of dimensions in millimeters and numbers of whorls are summarized in the following table. In the table, specimen H1 is the holotype, and specimens P1 and P3 are paratypes.

Species	<u>S. sparsicostata</u>				<u>S. lonsdalei</u>				<u>S. texasiana</u>			
Specimen	1	2	3	4	H1	P1	P2	P3	1	2	3	4
Diameter	2.7	2.7	2.6	2.5	2.8	2.8	2.7	2.7	2.4	2.3	2.2	2.0
Height	1.9	2.0	2.1	1.9	2.4	2.5	2.3	2.1	1.9	1.9	1.6	1.6
No. of ribs	34	36	36	34	41	44	48	45	52	50	52	51
No. of whorls	5.5	5.5	5.5	5.5	6	6	5.9	5.9	5.5	5.5	5.3	5.5

Type locality: Kansan terrace deposits in left bank of White River, near bridge on Texas Highway 261, 6.5 miles east of Kalgary, Crosby County, Texas.

Areal and stratigraphic distributions: At present *S. lonsdalei* is known from the Pleistocene deposits of Kansan to Wisconsinan age at 13 localities distributed from western Oklahoma to northern Texas. Representative localities, age of deposits, and approximate number of specimens obtained at each locality are as follows:

Kansan deposits, NW ¼, sec. 23, T. 23N., R. 18W., 2.5 miles west and ¾ mile north of Quinlan, Woodward County, Oklahoma. No. 4337, KU, 70 specimens.

Kansan deposits in road cut on Texas Highway 70, 1 mile north-northeast of Turkey, Hall County, Texas. No. 11848, KU, 10 specimens.

Kansan deposits in left bank of White River, near bridge on Texas Highway 261, 6.5 miles east of Kalgary, Crosby County, Texas. No. 11650, KU, 60 specimens. (Type locality.)

Kansan deposits exposed in cut bank, 2.2 miles west of Post, Garza County, Texas. No. 10854, KU, 40 specimens.

Wisconsinan terrace deposits on north side of U.S. Highway 83, 4.1 miles east of Crosbyton, Crosby County, Texas. No. 10237, KU, 150 specimens.

Wisconsinan terrace deposits, 5 miles northeast of bridge on

U.S. Highway 77 over Red River, northern central Cook County, Texas. No. 12123, KU, 10 specimens.

STROBILOPS LONSDALEI CANSASIANA, new subspecies. Plate 6, figs. 3-4; text fig. 3.

Diagnosis: Shell broadly conic, moderately elevated; whorls $5\frac{1}{2}$ in number sculptured by 43 to 52 moderately spaced ribs; base almost smooth or finely striate; parietal lamellae penetrating from $\frac{1}{2}$ to $\frac{5}{8}$ of last whorl.

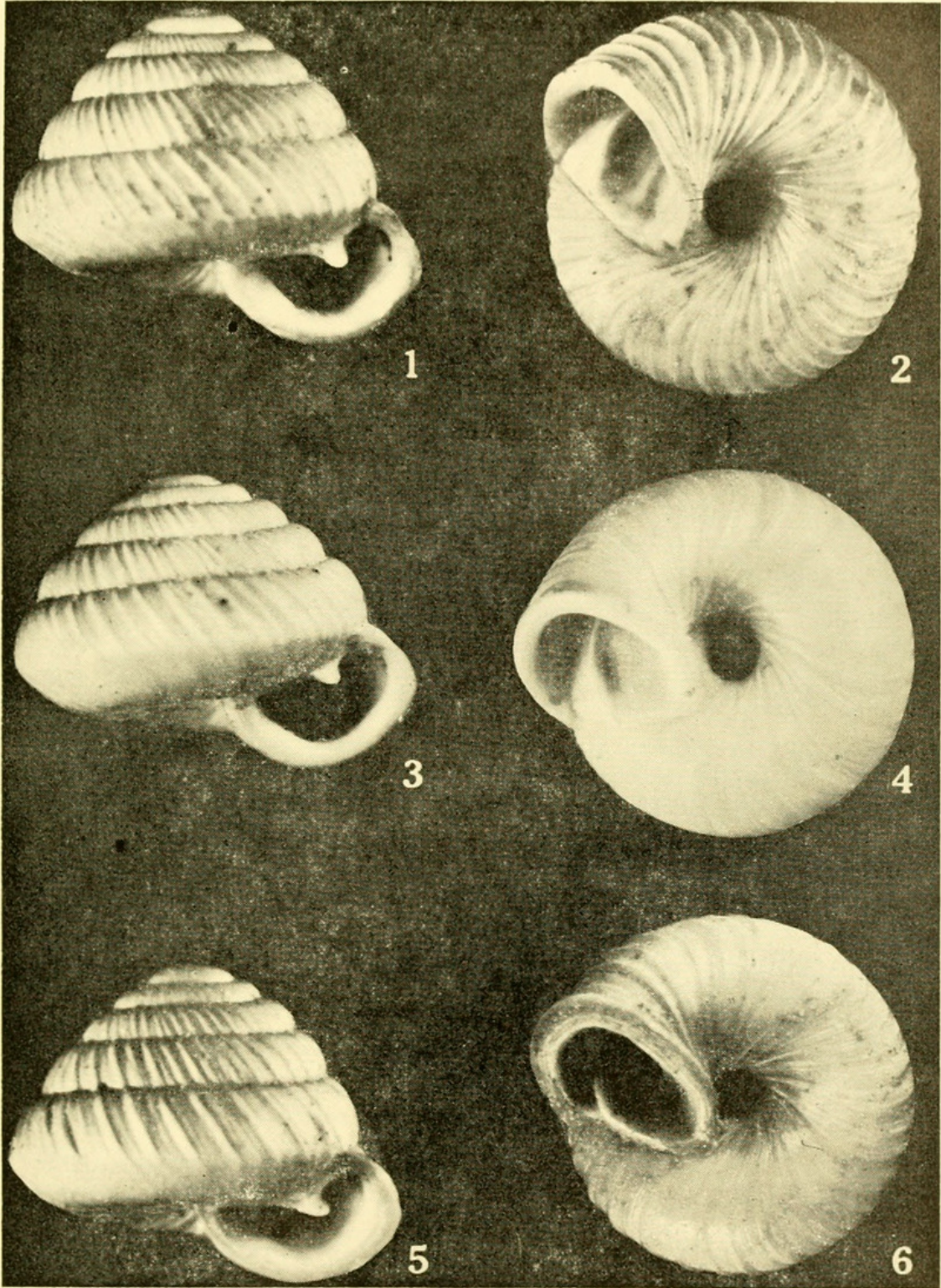
Holotype: Catalogue number 12181, KU, obtained by Dr. C. W. Hibbard, August 9, 1943.

Description of Holotype: Shell moderate, broadly convex; whorls $5\frac{1}{2}$ in number, convex; last whorl decidedly angulate; base more or less narrowly rounded; first $1\frac{1}{2}$ whorls finely granulose, remaining whorls sculptured by moderately spaced, moderately thickened ribs passing over base in extremely fine striae; diameter of umbilicus contained about 8 times in diameter of shell; aperture lunate, expanded, having moderate peristome and parietal callus; parietal lamella nodose, penetrating one-half a whorl inward; interparietal lamella nodose, weak, shortly emerged and penetrating as deep as parietal lamella; infraparietal lamella shortly emerged, longer than interparietal lamella, penetrating as far as parietal lamella; baso-palatal folds similar to those of *S. lonsdalei lonsdalei* (internal structure of shell based on paratype).

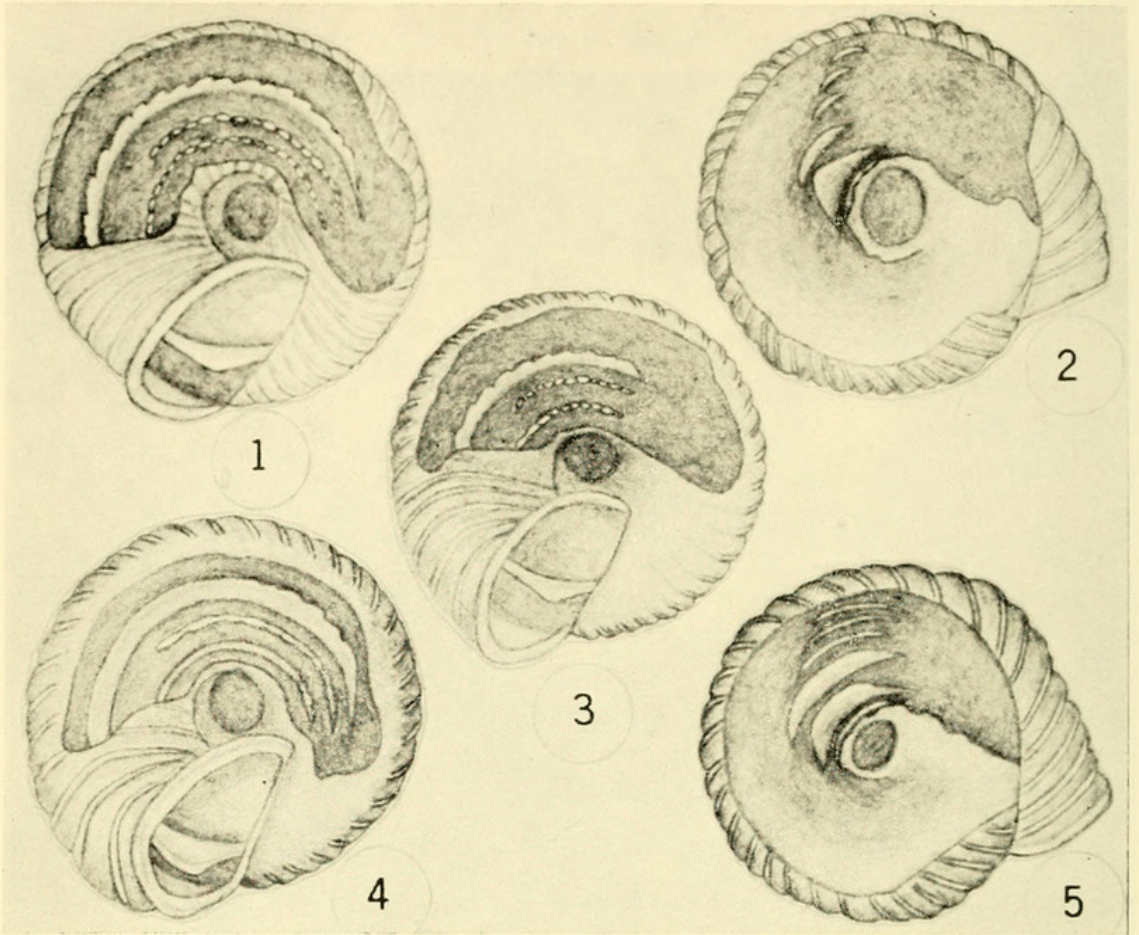
Paratypes: Few variations are noted in more than 2000 paratypes from 8 localities. The parietal lamellae penetrating $\frac{1}{2}$ last whorl inward in most specimens, but about $\frac{5}{8}$ last whorl in the specimens from Reno County, Kansas, and Greer County, Oklahoma. The base is smooth or finely striate in most examples, but a few ribs are present immediately behind the peristome of a few specimens. The baso-parietal folds are as variable as those of *S. lonsdalei lonsdalei*. Variations in size of shell, and number of ribs are exemplified in the following measurements:

	Holotype	Paratypes		
Diameter (mm.)	3.1	2.6	2.7	3.1
Height (mm.)	2.2	2.1	2.0	2.1
No. of ribs	45	52	44	43
No. of whorls	5.5	5.5	5.5	5.5

Comparisons: This subspecies differs from *Strobilops lonsdalei lonsdalei* in having smaller shell with broad and smooth base, less elevated spire, more ribs, and shorter parietal lamellae. All other characteristics appear to be similar to *S. lonsdalei lonsdalei*. *S. lonsdalei cansasiana* resembles *Strobilops texasiana* in having the same number of ribs, but the former differs from the latter



Figs. 1, 2. *Strobilops lonsdalei lonsdalei* Ho and Leonard. Lateral and basal views of holotypical shell. Figs. 3, 4. *S. lonsdalei cansasiana* Ho and Leonard. Lateral and basal views of holotypical shell. Figs. 5, 6. *S. sparsicostata* Baker, Lateral and basal views of topotypical shell from Rexroad Ranch, 9 miles south and 7 miles west of Meade, Meade County, Kansas. All figures enlarged approximately 15 times.



Sections of last whorl of *Strobilops* showing internal lamellae and folds of the shell. All figures enlarged approximately 14 times. Figs. 1, 2. *Strobilops lonsdalei lonsdalei* Ho and Leonard, paratypes. Fig. 3. *S. lonsdalei cansasiana* Ho and Leonard, paratype. Figs. 4, 5. *S. sparsicostata* Baker, topotypes.

in bearing rather coarse and widely spaced ribs, smooth base, and a decidedly angulate last whorl.

Type locality: Kansan deposits, SW $\frac{1}{4}$, sec. 2, T. 31S, R. 28W., 6 miles north of Meade, Meade County, Kansas.

Areal and stratigraphic distributions: *S. lonsdalei cansasiana* is now known only from Kansan deposits in Iowa, Kansas and Oklahoma. The southern range of *S. lonsdalei cansasiana* overlaps with the northern range of *S. lonsdalei lonsdalei* in western Oklahoma. Representative localities and approximate number of specimens in our collections are:

Kansan deposits, 1 mile east and 4 miles north of Little Sioux, Harrison County, Iowa. No. 4517, KU, 11 specimens.

Kansan deposits, SW $\frac{1}{4}$, sec. 2, T. 31S., R. 28W., 6 miles north of Meade, Meade County, Kansas. No. 3702, KU, 500 specimens. (Type locality.)

Kansan deposits, SW $\frac{1}{4}$, sec. 26, T. 14S., R. 2E., 4 miles west of Navarre, Dickenson County, Kansas. No. 4501, KU, 10 specimens.

Kansan deposits, sec. 36, T. 24S., R. 7W., 7 miles east and 1.1 miles north of Arlington, Reno County, Kansas. No. 9414, KU, 15 specimens.

Kansan deposits, sec. 8, T. 5N., R. 28E, near north border of Gate, Beaver County, Oklahoma. No. 4743, KU, 150 specimens.

Kansan deposits in right bank of North Fork of Red River, north of Rock Island Railroad, 2 miles east of Granite, Greer County, Oklahoma. No. 10751, KU, 70 specimens.

Ecology and relationships: The ecological requirements of this extinct species are not certainly known. The association of it with *Retinella electrina*, *Pupilla muscorum*, *Stenotrema leai*, and its occurrence in the alluvium of fine and well-sorted sands and silts seems to imply that the species thrived in rather humid and cool situations on the flood plains where vegetation was available. The exact cause of extinction is unknown, but the initiation of semiarid and otherwise severe climate in the High Plains at the time of the Bradyan interglacial interval may have been responsible. This view is strengthened by the fact that no single species of *Strobilops* and no other northern gastropod that lived in the area during pre-Wisconsinan time, is found alive in the White River region today.

S. lonsdalei is morphologically and stratigraphically intermediate between *S. sparsicostata* of the Nebraskan and existing *S. texasiana*, which extends to the Wisconsinan, but is more closely allied to *S. sparsicostata* than to *S. texasiana* on the basis of size and shape of shell. In the light of our present knowledge, *S. lonsdalei* seems to be on a side branch of the line leading from *S. sparsicostata* to *S. texasiana*. *S. sparsicostata* may have given rise to *S. lonsdalei* by development of ribs on the base of the shell, by increase in the number of ribs, and by reduction in size of denticles.

S. lonsdalei is named in honor of the late Dr. John T. Lonsdale, formerly Director, The University of Texas Bureau of Economic Geology, in recognition of his continued interest and support of our studies in Texas.

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