MOLLUSCS FROM A HOLOCENE PEAT DEPOSIT FROM TUXFORD, NOTTINGHAMSHIRE

by

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Summary

The paper describes the occurrence of a Holocene peat deposit and its associated mollusc fauna. The deposit was exposed during the initial excavations for the Tuxford By-Pass.

Introduction

During the initial excavation for the Tuxford By-Pass from November, 1965 to March, 1966, a large exposure of peat was encountered along the line of the road to the south of the town crossing the Goosemoor Dike (SK 745702). A second exposure occurred ½ mile to the south (SK 748695). In order that a firm foundation for the road could be obtained, it was necessary to remove the complete thickness of the deposits and then back-fill to the sub-base level of the road. At the time of the excavations, the opportunity was taken to study the deposits and collect samples for laboratory examination. It was noted that both the peats contained a large mollusc fauna which appeared to merit putting on record, since descriptions of similar peat deposits usually fail to mention the contained molluscs. The fauna described is from the first (Goosemoor Dike) exposure.

A short list of species from a peat at Maplebeck, Notts, was given in Lamplugh et al. (1911, p. 63). This deposit was said to be from the alluvium. It is possible that this record is slightly younger than that described in the present paper, as the peat at Tuxford was overlain by silty alluvium.

The stratigraphical description of the deposit was prepared by one of the authors (F.M.T.) and the palaeontology was investigated by the second (A.J.R.).

Occurrence

The excavations at the Goosemoor Dike exposure revealed the following sequence:-

Soil Sub-soil	}	Stripped off at the time of the examination.
Sandy Silt with clay		3 feet
Well rotted peat with tree roots		3 - 145 feet
Sands and gravels (interbedded)		20 feet approx.
Keuper Marl (from bore-hole evidence)		

The peat was excavated across the complete width (140 feet) of the road and for 400 feet along its length.

The site investigation report revealed that the bed-rock in this area was the Keuper Marl (Upper Trias). Although not seen at outcrop south of the town, the marl was exposed elsewhere along the line of the road in the bridge footings and in fine cuttings east and north-east of Tuxford.

The sands and gravels form part of the extensive deposits which formed along the margins of a lake that extended southwards from the Humber, along the line of the present Trent Valley and its tributaries. They consist of beds of pebbly sand and clays brought into the area at the close of the Pleistocene period. The sands and gravels form extensive terrace deposits of which there are commonly three distinct levels (Posnansky 1960). Those south of Tuxford are associated with the lower (floodplain) terrace.

The peat consists of compressed layers of vegetable material, mainly the moss, Sphagnum. It undoubtedly formed the environment in which most of the molluscs lived. The shells were distributed throughout the peat, but showed a preferential concentration in some layers. The upper four feet were particularly rich in molluscs and provided the fauna described below.

The Mollusc Fauna.

The mollusca were separated from the peat by first boiling in dilute sodium carbonate solution until disaggregated and then treating the product with 100 vol. hydrogen peroxide to oxidise the organic matter. The second half of the process was necessary owing to the fact that the disaggregated peat matted when dried and it therefore became impossible to sort out the shells. Again, it was not possible to sort out the disaggregated peat in water since this made the juvenile shells very difficult to see. The hydrogen peroxide worked fairly well and produced almost peat free samples.

Another method was tried, in which a sample of peat was treated with dilute (5%) hydrofluoric acid in order to convert the calcitic shells to calcium fluoride (Grayson, 1956). The peat was then removed by the application of Schultz Solution (potassium chlorate and fuming nitric acid). The fluorine replacement was found to be incomplete in the sample, most specimens being fragmentary as a result and thus of no use for frequency estimation. It was noticed, however, that the replaced specimens were transparent whilst immersed in alcohol, the columella being clearly visible (plate 11 Fig. 1). The shells became opaque on drying.

A list of the mollusca found in the peat is given below:-

Valvata cristata Müller	(pl.12 fig. 5)
Bithynia tentaculata (Linné)	(pl.11 fig. 3, pl. fig 8)
Carychium minimum Müller	(pl.11 fig.11)
Limnaea truncatula (Müller)	(pl.11 fig. 6)
L. palustris (Müller)	(pl.11 fig. 5)
L. peregra (Müller)	(pl.11 fig. 7)
Physa fontinalis (Linné)	(pl.11 fig. 4)
Planorbis leucostoma Millet	(pl.11 fig. 1)
P. crista (Linné)	(pl.12 fig. 2)
Succinea pfeifferi Rossmässler	(pl.11 fig. 8)
Cochlicopa lubrica (Müller)	(pl.11 fig. 2)
Vertigo antivertigo (Draparnaud)	(pl.11 fig. 9)
V. angustior Jeffreys	(pl.11 fig.10)
Vallonia pulchella (Müller)	(pl.12 fig. 7)
Clausilia bidentata (Ström)	(pl.11 fig.12)
Arianta arbustorum (Linné)	(pl.12 fig.11)
Helix hortensis Müller	(pl.12 fig. 9)
H. nemoralis Linné	
Hygromia hispida (Linné)	
Punctum pygmaeum (Draparnaud)	
Discus rotundatus (Müller)	(pl.12 fig. 4)
Limacid slug plates	(pl.12 fig. 3)
Euconulus fulvus (Müller)	(pl.12 fig.12)
Retinella radiatula (Alder)	(pl.12 fig. 6)
Zonitoides nitidus (Müller)	(pl.12 fig.10)
Sphaerium sp. indet.	
Pisidium personatum Malm	
P. obtusale (Lamarck)	

EXPLANATION OF PLATE 11

Fig. 1. Bithynia tentaculata (Linné). Oblique view of specimen treated with hydrofluoric acid and immersed in ethanol to show columella. (5.7 mm.)

Fig. 2. Cochlicopa lubrica (Müller). (5.6 mm.)

Fig. 3. Bithynia tentaculata (Linné). (10.7 mm.)

Fig. 4. Physa fontinalis (Linné). (2.7 mm.).

Fig. 5. Limnaea palustris (Müller) (14.0 mm.)

Fig. 6. L. truncatula (Müller). (4.4. mm)

Fig. 7. L. peregra (Müller). (12.6 mm.)

Fig. 8. Succinea pfeifferi Rossmässler (8.8 mm.)

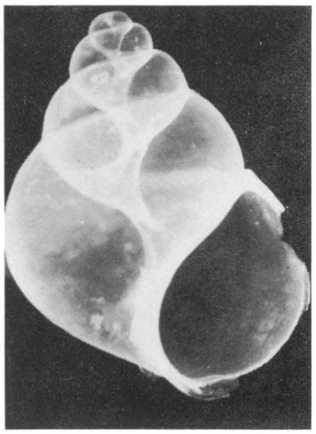
Fig. 9. Vertigo antivertigo (Draparnaud). (2.0 mm.)

Fig. 10. V. angustior Jeffreys. (1.6 mm.)

Fig. 11. Carychium minimum Müller. (1.6 mm.)

Fig. 12. Clausilia bidentata (Ström). (5.4 mm.)

All quoted measurements are heights. The specimens are all lodged in the Department of Geology, University of Nottingham.



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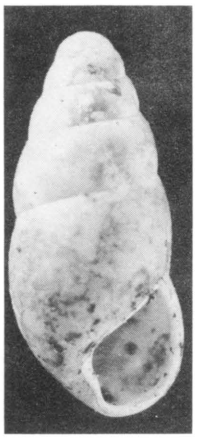

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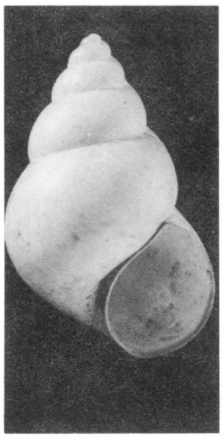

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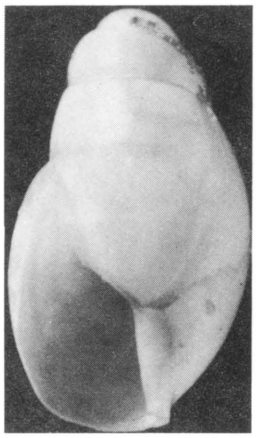

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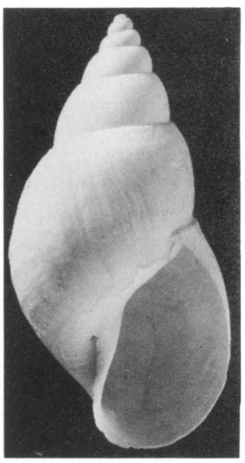

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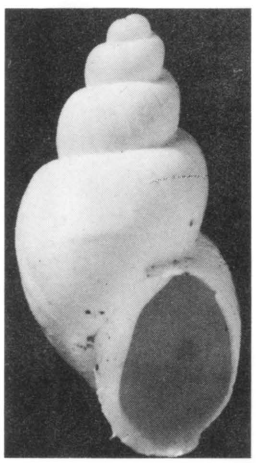

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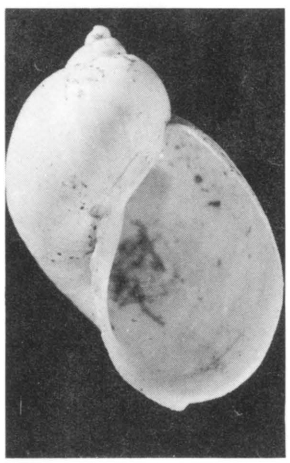

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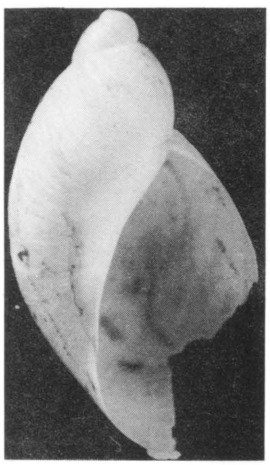

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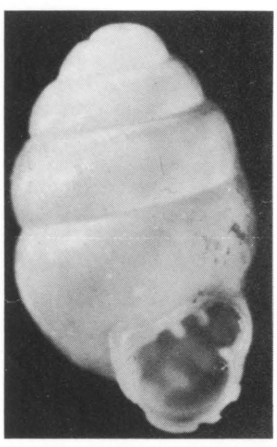

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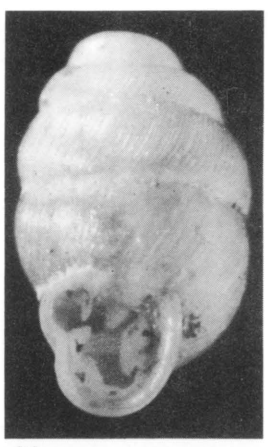

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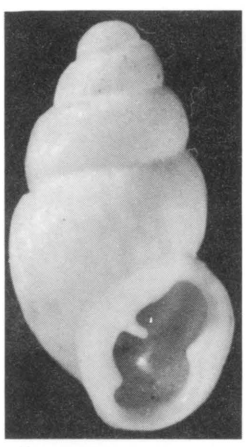

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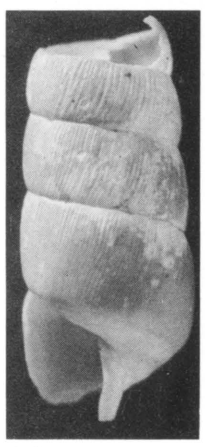

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The results of a numerical count of the mollusca in a weighed peat sample are given in Table 1.

TABLE 1

Frequency of Molluscs in a weighed peat sample

Species	No. of specimens in 111.7g sample	Relative percentage.
Carychium minimum Müller	166	23.4
Planorbis leucostoma Millet	163	23.0
Planorbis crista (Linné)	137	19.3
Zonitoides nitidus (Müller)	47	6.7
Succinea pfeifferi Rossmässler	24	3.4
Limnaea truncatula (Müller)	23	3.3
Discus rotundatus (Müller)	20	2.9
Euconulus fulvus (Müller)	20	2.9
Limacid slug plates	18	2.5
Cochlicopa lubrica (Müller)	17	2.4
Retinella radiatula (Alder)	13	1.8
Bithynia tentaculata (Linné) (9 opercula)	13	1.8
Limnaea palustris (Müller)	12	1.6
Vertigo antivertigo (Draparnaud)	10	1.4
Helix sp	6	0.9
Limnaea peregra (Müller)	5	0.7
Physa fontinalis (Linné)	4	0.6
Vertigo angustior Jeffreys	3	0.4
Clausilia bidentata (Ström)	3	0.4
Punctum pygmaeum (Draparnaud)	2	0.3
Valvata cristata Müller	1	0.1
Vallonia pulchella (Müller)	1	0.1
Hygromia sp.	1	0.1
TOTALS	709	100.0

The sample appears to be fairly representative of the peat seen, although one sample contained larger numbers of Valvata cristata represented by only one specimen in the sample studied.

Most of the molluscs typically frequent wet or marshy places, the most notable exception being Clausilia bidentata which usually lives in drier places, for example, on rock faces and trees. As would be expected in an acid environment most of the forms present are species which do not require a high lime content in the habitat.

Also found associated with the molluscs were the remains of an anuran amphibian and various ostracods, which were kindly identified by Mr. S.H. Eagar. They were:-

Candona neglecta Sars (dominant)
Cyclocypris laevis vavra Müller, G.W.
Herpetocypris sp. indet.

These are all freshwater forms and will tolerate limited saline conditions.

Conclusions

Twenty-eight species of mollusca are recorded for the peat. As the majority of them are characteristic of a damp or aquatic environment a wetter climate than at present exists in the Tuxford area is indicated. They lived after the deposition of the Trent Valley gravel deposits. All the species are represented by living animals at the present time in this country.

Acknowledgements

The attention of one of the authors (F.M.T.) was first drawn to the existence of this deposit by various members of the East Midlands Geological Society. Further information concerning the nature of the excavation was provided by the Resident Engineer, Mr. D. Thompson and by the Nottinghamshire County Council Surveyor's Department. Acknowledgement is also made to Mr. C.P. Castell and Mr. J. Cooper of the Department of Palaeontology, British Museum (Natural History) for their help with the identification of some of the molluscs; to Mr. S.H. Eagar of the same department for identifying the ostracods; and to Dr. M.P. Kerney of the Department of Geology, Imperial College for the identification of the two species of Pisidium.

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REFERENCES

BOYCOTT, A.E. 1934. Habitats of land mollusca in Great Britain. J. Ecol., vol. 22, pp. 1-38, 1 text-fig.

1936. The habitats of freshwater mollusca in Britain. J. Anim. Ecol., vol. 5, No. 1, pp. 116-186, pls. 3-4, 63 text figs.

GRAYSON, J.F. 1956. The conversion of calcite to fluorite. Micropaleontology, vol. 2, No. 1, pp. 71-78, text-figs. 1-9, 1 table.

JANUS, H. 1965. The young specialist looks at land and freshwater molluscs. London (Burk), 180 pp., many text-figs.

LAMPLUGH, G.W. et al 1911. The geology of the country around Ollerton. Mem. Geol. Surv., G.B., 93pp., 4 pl., 6 text-figs., 1 appendix.

POSNANSKY, M. 1960. The Pleistocene succession in the middle Trent basin. Proc. Geol. Assoc., vol. 71, pp. 285-311, text-figs. 1-8, 2 appendices.

SWINNERTON, H.H. 1948. Pleistocene and later deposits in MARSHALL, C.E. et al., 1948, Geology of the East Midlands, University of Nottingham, pp. 76-79, text-fig. 8-1.

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EXPLANATION OF PLATE 12

Fig.1. *Planorbis leucostoma* Millet. (6.9 mm.)

Fig. 2. *P. crista* (Linné). (1.8 mm.)

Fig. 3. Limacid slug plate. (2.7 mm.)

Fig. 4. *Discus rotundatus* (Müller). (1.9 mm.)

Fig. 5. *Valvata cristata* Müller. (1.0 mm).

Fig. 6. *Retinella radiatula* (Alder). (2.1 mm.)

Fig. 7. *Vallonia pulchella* (Müller). (1.1 mm.)

Fig. 8. *Bithynia tentaculata* (Linné). Operculum. (3.9 mm.)

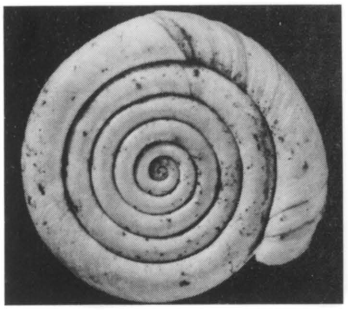
Fig. 9. *Helix nemoralis* Linné. (15.0 mm.)

Fig. 10. *Zonitoides nitidus* (Müller). (3.7 mm.)

Fig. 11. *Arianta arbustorum* (Linné). (15.8 mm.)

Fig. 12. *Euconulus fulvus* (Müller). (2.0 mm.)

All quoted measurements are heights except for figures 1 and 2, where the breadth is given. The specimens are all lodged in the Department of Geology, University of Nottingham.



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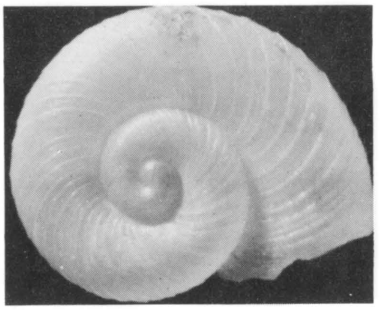

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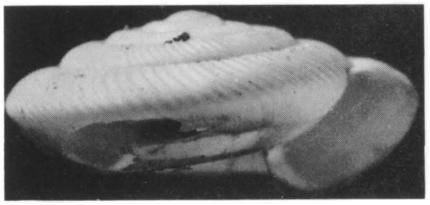

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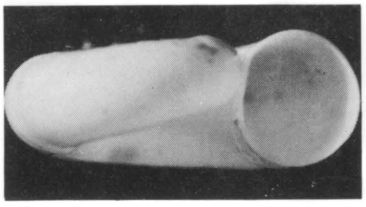

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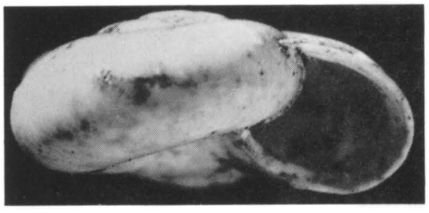

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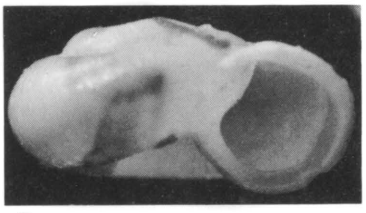

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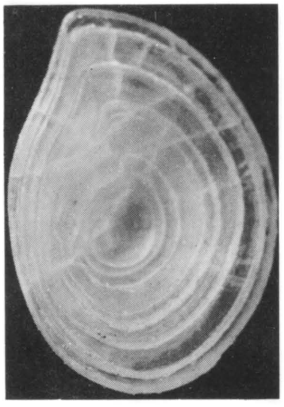

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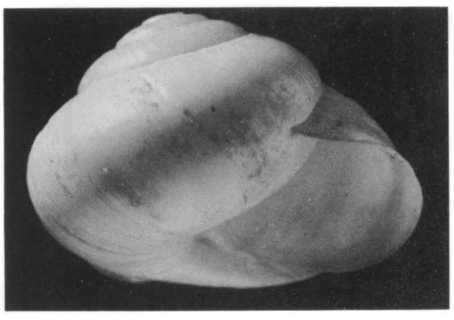

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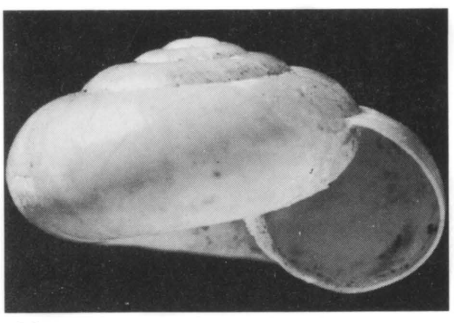

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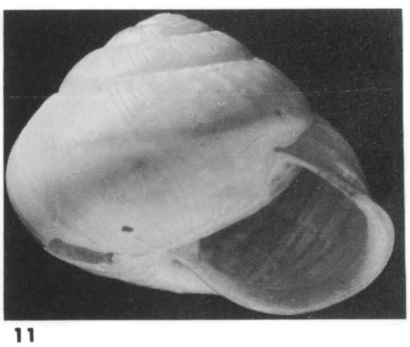

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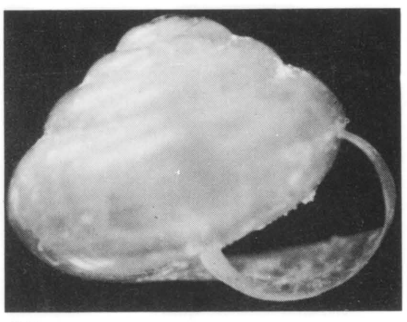

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