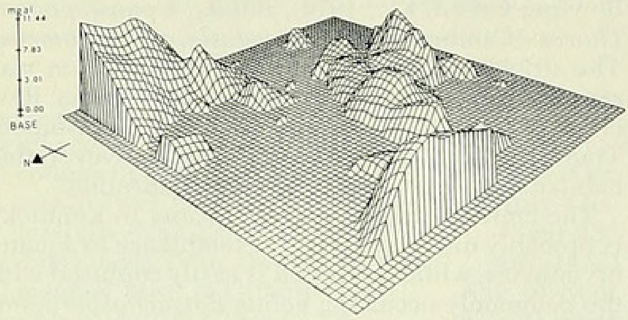

FIG. 2. Second order residual surface for Bouguer gravity, as viewed from the northwest direction. (Positive residual values are in milligals.)

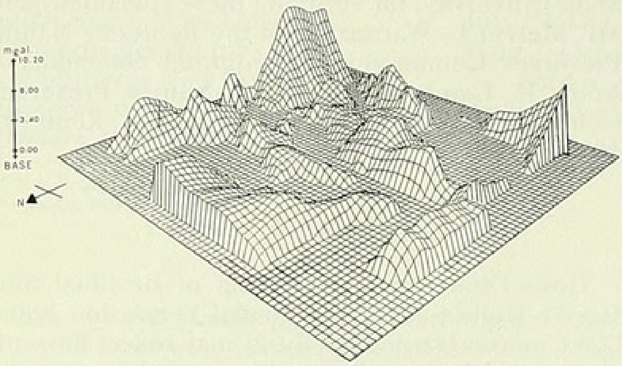

FIG. 3. Third order residual surface for Bouguer gravity, as viewed from the northwest direction. (Positive residual values are in milligals.)

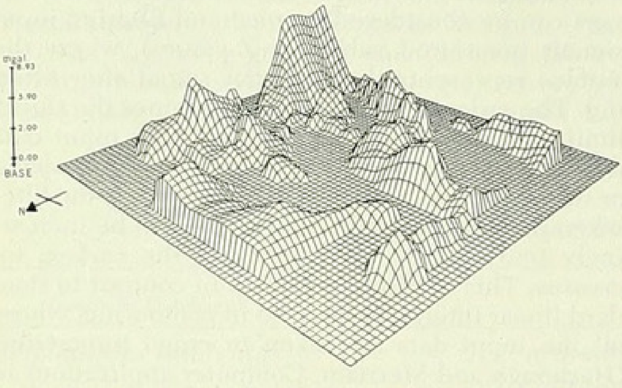

FIG. 4. Fourth order residual surface for Bouguer gravity, as viewed from the northwest direction. (Positive residual values are in milligals.)

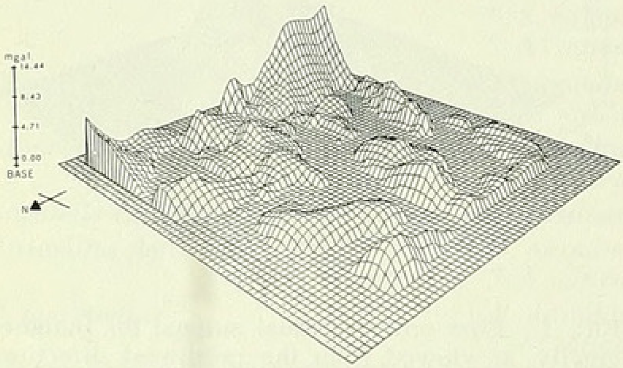

FIG. 5. Fifth order residual surface for Bouguer gravity, as viewed from the northwest direction. (Positive residual values are in milligals.)

stratigraphic analysis, John Wiley, NY, 1967; Dougenik and Sheehan, SYMAP user's reference manual, Harvard U., Cambridge, MA, 1979). However, a visual check on the accuracy of the filtering mechanism of trend-surface analysis would be very helpful in localing sources of noise or localized variation. In addition, visual inspection would be of great value in determining the effectiveness of increasing the order of the regression equations to account for additional variation of the spatially oriented data.

A recent study by Henning and Smith (Trans. Ky. Acad. Sci. (abs.) 43 (1–2):92, 1982) dealing with a gravity survey of Early and Middle Precambrian rock units in southwestern Marathon County, central Wisconsin, utilized trend-surface analyses. Bouguer and free-air gravity values collected from 208 stations were analyzed to determine regional trends and sequentially compared with hand-specimen petrology on representative samples of 738 samples collected at approximately 100 sites to determine if an interpretative relationship existed between the gravity anomalies and major lithographic units in the area. However, in determining the effects of increasing the order of the regression equation on local variation and where residuals were occurring, the authors created three-dimensional plots at The University of Akron's computer center, via an incremental drum plotter reading a data matrix from tape. The data matrix was created by using SYMAP and creating a tape file for each residual surface, first through sixth order, for Bouguer and free-air gravity values. The original gravity stations were evenly distributed over the entire study area.

Figures 1 through 5 are representative three-dimensional plots of positive residual surfaces of Bouguer and free-air gravity values, measured in milligals. All figures are viewed from the NW, 30° from the datum plane. Figures 1 through 5 are the first complete to the fifth-order residual surfaces for Bouguer gravity, respectively.

From a brief visual inspection of the various models of the positive residual surfaces (Fig. 1) a definite NW–SE trend of residual values or localized noise, not explained by the first degree surface, is illustrated. As one inspects the second residual surface (Fig. 2), the NW–SE trend is still visable, as well as a large residual anomaly in the NE corner of the study area. Figures 3, 4, and 5 illustrate the greater spatial diversity or spread of the noise in the gravity values, as the order of the surface increases.—A. D. Smith and R. J. Henning, Dept. of Geol., East. Ky. Univ., Richmond, Kentucky 40475.

First Records of *Ligumia subrostrata*, *Toxolasma texasensis*, and *Uniomerus tetralasmus* for Kentucky.—The mussel fauna of Kentucky is relatively well-known; however, the lowland areas of the western one-third of the state have only recently been examined for unionid species. Aquatic biota surveys in Ohio River tributaries and the lower Green, Tradewater, and Clarks rivers resulted in the addition of three pelecypod species to the fauna of Kentucky: *Ligumia subrostrata*, *Toxolasma*

(=*Caruncullina*) *texasensis*, and *Uniomerus tetralasmus*.

Price (Nautilus 14:75–79, 1900) mentioned *L. subrostrata* from Kentucky although no locality or drainage was given, and based on Price's report, Ortmann (Ann. Carnegie Mus. 17:167–189, 1926) speculated that the species may be present in the lower Green River. Ortmann's speculation was recently confirmed upon examination of specimens from a Pond River oxbow in Hopkins Co. (G. J. Fallo, pers. comm.). Our specimens were collected in Weirs Creek Swamp (Tradewater River drainage), 13 August 1980, 3.4 km SE of the junction of KY 814 and U.S. 41A and 6.4 km WSW of Nebo, Hopkins Co. and West Fork Clarks River (Tennessee River drainage), 4 May 1982, at the Ky 131 crossing, Graves Co. Although these are the first substantiated records of the species from Kentucky, its occurrence is not unexpected since the species is known throughout the Mississippi River drainage north to Wisconsin and South Dakota (Parmalee, Ill. State Mus. Pop. Sci. Ser. 8:1–108, 1967).

The record reported herein for *T. texasensis* represents the first published locality for Kentucky. Although some authors regard *T. texasensis* as a synonym (Johnson, Bull. Mus. Comp. Zool. Harvard Univ. 149:77–189, 1980) or possible form (Parmalee 1967) of *T. parva*, we follow Stansbery (Ohio State Mus. Zool. Rept. No. 4:1, 1982) in assigning the specific epithet. The species was discovered in Smith Ditch (Tradewater River drainage) on 9 December 1981 at the U.S. 60 crossing in Union Co. Parmalee (1967) characterized the distribution as the southern Mississippi River drainage with the northernmost populations occurring in southern Illinois.

Although Bickel (Sterkiana 28:7–20, 1967) included *U. tetralasmus* in a list of Kentucky species based on Simpson (A Descriptive Catalogue of the Naiades, or Pearly Freshwater Mussels: Parts I and II, Bryant Walker, Detroit, Mich., 1900), no published drainage or locality records are available for the state. The species was collected from the following Kentucky localities: Craborchard Creek (Tradewater River drainage), 9 December 1981, at the KY 1340 crossing, Webster Co.; Donaldson Creek (Tradewater River drainage), 10 December 1981, at the KY 293 crossing, Caldwell Co.; Smith Ditch (Tradewater River drainage), 9 December 1981, U.S. 60 crossing, Union Co.; Crane Pond Slough (Green River drainage), 23 July 1980, 3.4 km NE Pleasant Ridge, Daviess Co.; Capertown Swamp (Ohio River drainage), 12 May 1981, 6.3 km SW town of Harrods Creek, Jefferson Co.; Canoe Creek (Ohio River drainage), 10 September 1908, at U.S. 41A crossing, Henderson Co. The records cited herein indicate that *U. tetralasmus* is widespread in western Kentucky and apparently common in the Tradewater River. The species is widely distributed in the Mississippi River drainage (Parmalee 1967).

The 3 species noted herein for the first time in Kentucky are all inhabitants of ponds, sloughs, backwaters, and other soft-bottomed lentic environments (Parmalee 1967). Additionally, as noted, they are all widespread in the Mississippi River drainage and have been reported in several surrounding states. Based on the available evidence, the lack of substantiated records for these species is not due to their rarity or limiited distribution but is a result of the neglect of collecting in their preferred habitats. Most pelecypod surveys have focused on the upland portions of Kentucky's rivers, and little effort has been directed toward lowland habitats. We feel that these species are more widely distributed and common than our records indicate, and the Kentucky range will undoubtedly be expanded as survey efforts focus on the lowland habitats of western Kentucky. Nevertheless, documentation of *L. subrostrata*, *T. texasensis*, and *U. tetralasmus* in Kentucky further expands our knowledge of the speciose Kentucky fauna and emphasizes the need for additional collecting in poorly known regions of the state.

We wish to thank Dr. David H. Stansbery, Ohio State Museum of Zoology, for identifying various specimens and Mr. Keith E. Camburn of the Kentucky Nature Preserves Commission for editorial comments.—Melvin L. Warren, Jr., Kentucky Nature Preserves Commission, 407 Broadway, and Samuel M. Call, Division of Environmental Services, 18 Reilly Road, Frankfort, Kentucky 40601.

Comparison of Serum Proteins and Esterases in Three Subspecies of the Bobwhite Quail (*Colinus virginianus*).—This study was conducted to determine if differences in biochemical characters exist between 3 subspecies of the bobwhite quail: *Colinus virginianus virginianus*, *Colinus virginianus*, and *Colinus virginianus texanus*. The presence of significant dissimilarities could possibly support the credibility of the subspecies of this species. A number of avian systematists believe the category of subspecies to be pointless (Dorst, The Life of Birds. Columbia Univ. Press, Vol. 1; 1974) because the subspecies may be synonymous with local populations (Farner and King, *Avian Biology*. Academic Press, New York, Vol. 1; 1971).

Montag and Dahlgren (The Auk 90:318–323, 1973) found esterases, transferrins, and pre-albumins the most likely serum components to show intraspecific variation. This study was, therefore, based upon a qualitative and quantitative comparison of serum proteins (including transferrins and pre-albumins) and serum esterase isozymes.

Sibley and Johnsgard (Condor 61:85–95, 1959) established that individual avian species can be identified by electrophoretic analysis of their sera. Sibley (Condor 102:215–284, 1960) obtained valuable taxonomic information at the species level by studying avian egg-white proteins using paper electrophoresis.

Transferrins are known to show genetic variation in a wide range of species. Mueller et al. (Genetics 47:1285–1392, 1962) were able to distinguish *Columba livia* and *C. guinea* by means of transferrin phenotypes. Baker and Hanson (Comp. Biochem. Physiol. 17:997–1007, 1966) found 3 *Branta canadensis* subspecies to have different transferrin phenotypes than those observed in 4 other subspecies. Quinteros et al. (Genetics 50:579–582, 1964) found