Reanalysis of geographic variation of House Sparrow energetics.—In an analysis of North American populations of House Sparrows (*Passer domesticus*), I concluded (1973) that there was no significant interlocality variation in existence energy. The statistical procedures I used in this part of the study are unsophisticated at best. Recent reanalysis of the same data by modern multiple regression techniques reveals a statistically significant variation in existence energy that is partly attributable to locality.

Multiple regression analyses are particularly useful in the present instance, as the relative importance of several independent variables can be simultaneously assessed by comparisons of standard partial regression coefficients and the amount of variability explained by the model can be evaluated from the multiple correlation coefficient (see Power 1969, Zar 1974). Typically all independent variables suspected to be important are initially included in the analysis. The least important variables, as judged by the reduction of the sum of squares unexplained by regression, are individually excluded in subsequent models until all remaining independent variables are judged to contribute significantly ($P < 0.05$) to the prediction of the dependent variable ("step-down" model). This does not insure that all important independent variables have been included but, in analyses of a large data set, does offer evidence that allows us to evaluate variables that we recognize as being of probable importance.

Existence energy, the difference between energy intake and energy excreted during a period in which the bird loses or gains less than 2% of its body weight, was measured using sparrows collected at nine localities (Blem 1973). The data set, 398 determinations from 167 individuals, was analyzed using the "stepwise" multiple regression procedure of the statistical analysis system (Barr and Goodnight 1972), a statistical package executed by IBM 370/145 computer. This package provides both a "step-down" (as above) and "step-up" procedure and further analysis of the relative contribution of independent variables to the prediction of the dependent variable.

Independent variables associated with measurements of existence energy (EE) in kcal/g-day include sex, season of the study (winter or summer), experimental ambient temperature in °C (T_a), weight in g to the 0.75 power ($W^{0.75}$), change of weight in g during the experimental period (WC), mean January and July dry-bulb temperatures of the collection locality (WM and SM), and isophane of the collection site (I). Isophane is an index calculated from longitude, latitude, and altitude (Hopkins 1938) and is theoretically related to gross climatic features. Computer runs incorporating weight expanded to the exponential powers 0.67, 0.70, 0.72, 0.75, and 0.80 indicated a slightly better fit when $W^{0.75}$ was used. Sex is a classification variable where males and females are coded 1 and 2 respectively.

Previous studies (Davis 1955) and preliminary analyses of the present data set indicated a statistically significant seasonal variation in existence energy, therefore summer and winter measurements were examined separately. The equation for summer-tested birds (N = 129) is: EE = 1.253 − 0.014 T_a − 0.054 $W^{0.75}$ + 0.035 Sex + 0.014 SM − 0.005 WM. Standard partial regression coefficients are − 0.94 (T_a), −0.18 ($W^{0.75}$), 0.09 (Sex), 0.36 (SM), and −0.36 (WM). The coefficient of determination (R^2) is 0.82. The equation for winter-tested sparrows (N = 269) is: EE = 1.395 − 0.013 T_a + 0.101 WC −0.047 $W^{0.75}$ + 0.003 I. Standard partial regression coefficients are −0.87 (T_a), 0.17 (WC), 0.13 ($W^{0.75}$), and 0.07 (I), $R^2 = 0.71$. In several runs isophane was removed, as it is highly correlated with most climatic variables and might mask the effects of dry-bulb temperatures. The equation for summer-tested birds scarcely changed at all, while the partial regression coefficient for July dry-bulb temperature became significant in the winter equation. In all cases, "step-down" and "step-up" procedures produced equations that included the same set of independent variables.

The obvious importance of ambient temperature and body weight in the energy expenditure of birds is too well known to merit further discussion except to point out that these variables account for much of the variation in energetics of sparrows collected in both seasons. Sex is a significant factor in summer-tested birds, probably because of the higher energetic costs of oogenesis (King 1972). The significant variation attributable to weight change in winter-tested birds may be due to a greater portion of weight change involved in energy rich lipid exchange. The greater EE associated with increased SM in summer-tested birds may reflect decreased insulation of sparrows collected at southern sites. The increase of EE with isophane in winter tests or with decrease in WM in summer tests is not an effect of insulative variations as House Sparrows from areas of greater isophane or lower WM tend to have greater insulation (Blem 1974) and hence lower EE (see Kendeigh and Blem 1974).

In summary, significant interlocality variation in the energetics of House Sparrows exists that may be attributable to climatic differences between collection sites. This is particularly interesting as the species was introduced into North America from Europe only 125 years ago.

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LITERATURE CITED

BARR, A. J., & J. H. GOODNIGHT.   1972.   A user's guide to the statistical analysis system. Raleigh, North Carolina State Univ. (Student Supply Stores).

BLEM, C. R.   1973.   Geographic variation in the bioenergetics of the House Sparrow. Ornithol. Monogr. 14: 96–121.

———.   1974.   Geographic variation in thermal conductance in the House Sparrow, *Passer domesticus*. Comp. Biochem. Physiol. 47A: 101–108.

DAVIS, E. A.   1955.   Seasonal changes in the energy balance of the English Sparrow. Auk 72: 385–411.

HOPKINS, A. D.   1938.   Bioclimatics, a science of life and climate relations. U.S. Dept. Agr. Misc. Publ. No. 280.

KENDEIGH, S. C., & C. R. BLEM.   1974.   Metabolic adaptation to local climate in birds. Comp. Biochem. Physiol. 48A: 175–187.

KING, J. R.   1972.   Energetics of reproduction in birds. Pp. 78–107 *in* Breeding biology of birds (D. S. Farner, Ed.). Washington, D.C., Natl. Acad. Sci.

POWER, D. M.   1969.   Evolutionary implications of wing and size variation in the Red-winged Blackbird in relation to geographic and climatic factors: a multiple regression analysis. Syst. Zool. 18: 363–373.

ZAR, J. H.   1974.   Biostatistical analysis. Englewood Cliffs, New Jersey, Prentice-Hall, Inc.

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Polygynous breeding of Short-billed Marsh Wrens.[1]—Although Verner and Willson (1969) suspected the Short-billed Marsh Wren (*Cistothorus platensis*) to be polygynous, this has not been definitely established. This paper provides evidence to suggest that, at least occasionally, Short-billed Marsh Wrens do breed polygynously. Because little is known of its breeding biology, this paper also presents limited data on basic breeding characteristics. Fieldwork was conducted from 4 June to 1 August 1974 on Dewey's Pasture, a glacial marsh complex in northwestern Iowa described by Bennett (1938).

Nests were located by searching the vegetation in the vicinity of singing territorial males systematically. As with many other wrens, male Short-billed Marsh Wrens build several nests during the breeding season, only a few of which are used by females (Mousley 1934). Searches were made periodically throughout the summer to locate all active nests. All territories were mapped, and most males and females were caught with mist nets and banded. The date the first egg was laid was used as an indicator of nesting chronology. When unknown, this date was estimated by backdating from the day of hatching, assuming that Short-billed Marsh Wren females lay one egg per day and require 14 days for incubation (Mousley 1934). Clutch size and fledging success were determined by checking each nest every 1–3 days. Fledglings from seven nests were weighed daily with a triple-beam balance.

Pair bond terminology for polygynous females is the same as used by Martin (1974); the first females to nest in a male's territory were called primary females, and all those nesting subsequently were termed secondary females.

All statistical comparisons were made with a Student's *t*-test (Steel and Torrie 1960).

Pair bonds.—Definite proof of polygyny requires observation of a male copulating and maintaining pair bonds with two or more females (Price and Bock 1973). Copulation was never seen in this study. I considered males to be polygynous if they defended territories that included the subterritories of two or more females.

A total of 26 male territories was searched for nests. Of these 21 (81%) of the males mated monogamously, and 5 (19%) mated bigamously. No males mated with more than two females. Some males occupied territories during June and July, but remained mateless. Because the exact number of these males was not determined, they are not included in the totals just given. Whether these bachelor males attracted females in August was not determined.