

in pigmentation in the area of overlap is nothing short of remarkable. The paler, Kumlien's Gulls, are probably not distinguishable (at least in this respect) from the Iceland Gulls of Greenland, with their clear irides and white wings, while the sympatric Thayer's Gulls are as dark as they come.

I think Smith may be mistaken in his conclusion on nest-site competition. In the absence of the Herring Gull from the western, central, and northern parts of the Canadian Arctic, the Glaucous Gull commonly breeds on islets and skerries. It is only in the East, where its range overlaps that of the Herring Gull, that it largely forsakes such nest sites^{3, 1}. The Glaucous Gull is similarly excluded from lowland and island nest sites in Iceland, this time by the Great Black-backed Gull⁴. Here again, the Glaucous Gull retreats to the cliffs in the presence of the competitor.

What zoogeographical evidence we have suggests that the Herring Gull is a newcomer to the Canadian Arctic. Furthermore, it nests with the small marine forms only on rare, atypical rookeries, of which Smith found four in Frozen Strait and I found two off southwest Baffin Island. The Glaucous Gull, on the other hand, is a regular congener of the smaller forms. Thus orbital ring colour has diverged, in my opinion, between Iceland, Kumlien's, and Thayer's gulls on the one side, and the Glaucous Gull on the other, and not between the former group and the Herring Gull. The pale orbital ring of the Herring Gull is perhaps the product of its association with another species (*L. fuscus*).

The controversial nature of some of the points which Smith discusses only lends spice to his unusually interesting study, which I recommend to the attention of every biologist interested in adaptation and the species concept. We can look forward to further rewarding investigation of the northern *Larus* associations, in which no doubt Smith's ingenious experimental methods will play an important part.

A. H. Macpherson

¹ Macpherson, A. H. 1961. Observations on Canadian arctic *Larus* gulls, and on the taxonomy of *L. thayeri* Brooks. Arctic Inst. of N.A. Tech. Paper No. 7. 40 pp.

² Salomonsen, Finn. 1950. Grønlands Fugle:

The birds of Greenland. Copenhagen. Munkegaard. 608 pp. (Danish and English).

³ Manning, T. H., E. O. Höhn and A. H. Macpherson, 1956. The birds of Banks Island. National Museum of Canada Bulletin. No. 143, iv + 144 pp.

⁴ Gudmundsson, Finnur. 1955. "[Icelandic birds. XI. The Glaucous Gull (*Larus hyperboreus*)]. Natúrufræðingurinn 25: 24-35.

INTRODUCTION TO ENVIRONMENTAL PHYSIOLOGY: ENVIRONMENTAL EXTREMES AND MAMMALIAN SURVIVAL. By G. EDGAR FOLK, JR. Philadelphia: Lea and Fibiger, 1966. 308 pages, 110 illustrations, appendices, bibliography, index. \$12.00 U.S.

Physiological reactions evoked by environmental conditions are as visible as their conditions and consequent reactions are measurable. In addition to curiosity for that which is new, economy of effort and thought have prescribed to environmental physiologists the selection of animals living in circumstances different from those of the moderate climates occupied by well-sheltered people and their domestic mammals. Folk does not hesitate to show that in addition to his interest in animal physiology he has enjoyed his own experience in the Arctic in deserts and on mountains. Without appreciation for geographical variation of animals and their circumstances, physiologists cannot recognize examples of adaptation to the environment. Fortunately, in recent years, many physiologists have recognized animals representing high degrees of adaptation with resulting enlargements of our knowledge and understanding. These findings are the subjects of Folk's book.

In an extensive chapter on biological rhythms I was less confused than by many reviews of this complex subject. Solar cycles appear to provide less noisy environmental signals than other daily and seasonal changes, and Folk has presented some of his own studies showing intrinsic circadian mammalian physiological rhythms in arctic winter and summer. Like most writers he oversimplifies arctic conditions in speaking of continuous daylight and darkness, for winter nights are not uniformly dark and summer days are not without a marked solar period-

icity. The quoted examples of physiological rhythms related to latitudinal and longitudinal variations in solar time show how far the few experiments are from determining the external signals and the internal clocks by which animals time daily and longer physiological rhythms.

There is an interesting chapter on mammals in cold and their utilization of insulation, if large enough, for free movement, or if too small their evasion of exposure. The encounter with heat involves more complex measurements, and the scale of naturally tolerable high temperatures is of comparatively short length for most animals. Adaptation to high temperatures is accomplished by extremely interesting behaviour and physiology which have prompted new studies revealing the ingenuity of nature and the perceptive imagination of experimental scientists.

The multiplying conferences, bureaus, studies, and courses using the term 'environmental' science illustrate that the subject is what one wants to make of it. Environment may refer to a portion of the earth, to the surroundings of an urban or other population and their influence upon health, agriculture, or industry. Folk has selected measurable conditions representative of several contrasting geographical regions and he has presented views of physiological reactions that result and appear to adapt individual men and other mammals to living where they are. Any one of us would be likely to select some other views and might differently relate the results with biology and human affairs. By looking at the situation through his own profession as a physiologist Folk has provided interesting examples of the physiology of mammals in relation to conditions in different regions of their natural environments. Readers will probably not criticize his special attention to the somewhat simplified view of arctic life that is provided by its extreme conditions.

Laurence Irving

STANDARD DEVIATIONS OF MONTHLY AND ANNUAL MEAN TEMPERATURES. By G. R. KENDALL and S. R. ANDERSON. *Climatological Studies Number 4*. Toronto: Canada Department of Transport, Me-

teorological Branch, 1966. 17 pages of text and tables + 16 figs.

This study follows the pattern of the other numbers in the series of Climatological Studies in summarizing the bulky climatological observations in a convenient form for the general user as well as for the scientist who has no access to the basic information.

Accordingly, the publication consists of 6 pages of tables of the monthly standard deviations which are well laid out and are easy to read. The only shortcoming is perhaps that too much geographical knowledge is assumed of the general reader, since only station names but no coordinates are given.

The data in the tables are further represented in 16 pages of monthly maps of the standard deviation and graphs of the annual trend for selected stations. All maps and graphs are clear and well represented.

In the text (11 pages) the authors discuss first the method of calculation of standard deviations, the statistical assumptions in the concept of this parameter, and the errors. Although the text is short, it is easily understandable even to readers with no statistical background. This part is concluded with the welcome remarks about other information which can be obtained from the standard deviation, i.e. the calculation of degree days, a concept of importance to practical applications of climatology.

The discussion of the results covers only 11 pages and gives mainly the factual description of the monthly maps and annual trends, pointing out the facts already apparent from the graphical representations, namely that the variability of mean monthly temperatures is higher in winter than summer, and in winter higher in the mountains of the West and in Labrador than in the rest of Canada. The explanations for the shown phenomena, if given at all, are cursory and not very satisfying.

It seems, however, quite clear from the layout of the booklet that its aim is not the scientific analysis of an important climatic parameter, but rather the presentation of basic information. Viewed in this way the mentioned minor shortcomings are unimportant and the publication can be regarded as a valuable contribution to our knowledge of the climate of Canada.

E. Vowinckel