One important point is mentioned but quickly forgotten and buried under following detail: that is the fact that natural gas reserves in arctic Canada are only just reaching economic levels and that reserves of oil are nowhere near that level although extremely optimistic speculations have been made about their size. Despite the *present* urgency in the search for natural gas (which Mr. Rohmer brings out well), one cannot help feeling that, in the end, it is the development of oil reserves which will have the widest ramifications — in industrial, political, economic, social, or ecological terms. If massive reserves of oil are not found in the Canadian Arctic, the tone of this book will, in ten years' time, appear to have a hysterical ring. If, however, such reserves *are* found, this book will be seen as a timely first attempt at a virtually impossible task.

W. P. Adams

ARCTIC LIFE OF BIRDS AND ANIMALS INCLUDING MAN. By Laurence Irving. *Ecology and Zoophysiology Vol. 2. New York: Springer-Verlag, 1972. 6 11/16 x 9 15/16 inches, 192 pages, 59 illustrations. $14.00 U.S.*

A book on the life of birds and mammals in the Arctic by a zoophysiologist might well be devoted to an exhaustive and possibly exhausting account of the adaptations to cold shown by the arctic representatives of these two classes of animals. But Laurence Irving unlike most physiologists, who are largely laboratory orientated, is also a field naturalist and he devotes nearly half of his book to various aspects of the natural history of arctic birds and mammals under the general headings of migrations and maintenance of populations. The first section of the book is preceded by a useful introductory chapter on the arctic environment in general dealing with topics such as climate and the history of the arctic climate particularly during the Pleistocene in relation to migrations of animals and man into the area. This latter subject is again considered in more detail in later chapters on mammals and birds. As an example of the many points of interest in this section of the book one might cite the persistence of breeding on shore ice in the land-locked population of ringed seals in Lake Baikal and the Caspian. These seals are presumably relics of a southward displacement into the temperate zone from the Arctic, where the vast bulk of the species lives, during the Pleistocene. In the account of ptarmigan movements on p. 56 one might have expected some reference to Weeden's work on spatial separation of the sexes in winter in these birds. I also missed any reference to Alwin Pedersen's 166-page monograph on the polar bear in this section.

Since the work of others has shown a definite trend for clutch size in passerine birds to increase with latitude, more data on clutch sizes in the Arctic compared to other zones, beyond the brief comparison of a few arctic white-crowned sparrow clutches to more southern ones, might have been expected.

The larger clutch sizes of northern birds are attributed to longer days during the breeding season permitting longer periods of gathering food for the young. This raises a topic of some interest not dealt with in Irving's text, not as a matter of omission but rather because it has not been systematically studied, namely the effect of the 24-hour daylength of the arctic summer on the waking sleeping rhythm of birds.

The last seven chapters of the book deal with the maintenance and control of body temperature in the warm-blooded animals of the Arctic. "Cold Physiology" has been built up into something approaching a subdiscipline of its own. It is therefore refreshing to find that these chapters present this material not just for specialists but in a way which makes it accessible and useful to the general scientifically-orientated reader.

It is shown that of the various ways theoretically available for maintaining body temperature in a cold environment, essentially only one is used, namely high insulation provided by feathers, fur and, in pinnipeds, over most of the body by blubber. Body temperatures of arctic animals are not elevated compared to those of animals from other climates, nor is their resting metabolic rate strikingly high though it is raised to some degree in some. Ptarmigan have higher-basal metabolic rates than would be expected from general equations relating this rate to body weight in a variety of animals from various climates, and resting metabolic rate is reported as 25 per cent higher in northern Indians and Eskimos than in whites.

The efficiency of insulation in willow ptarmigan in winter is shown by their low critical temperature (the environmental temperature at which body production must be raised above the resting level to balance heat loss) of −6.3°C, the lowest yet recorded for any bird. It is about 25° in the temperate zone house sparrow. Arctic foxes have shown critical temperatures below — 30°C. whereas that of man unclothed of 27°C., corresponding to his probable origin, places him in this respect among tropical mammals. The last chapter is devoted to man in the cold. Beyond the moderate elevation of resting metabolic rate in natives of the Arctic

already mentioned, there is little indication of physiological adaptation to the climate, and man, in contrast to other mammals, owes his ability to survive in the far north to cultural adaptation in the matter of dress, shelter and the use of fire.

Though the provision of adequate insulation provided by the winter plumage or pelage, supplemented by elevations of metabolic rate above the resting level during exposure to subcritical temperatures furnish the key to the problem of survival of warm-blooded animals in cold environments, there is much more to the story. This is shown by much interesting material reviewed in these chapters. For example, the extremities of animals are generally less well insulated than the trunk and show lower skin temperatures than the latter in the cold. There are adaptations which permit nerve conduction in cold extremities and others which furnish such areas with a minimal blood supply, sufficient to prevent freezing and yet such as to minimise loss of heat by the bloodstream.

The author has worked in Alaska for a considerable period and it is understandable that the bulk of his data is drawn from observations made in that State, but the reader may be forgiven the occasional feeling that some pertinent material from elsewhere may exist which might have thrown further light on certain topics.

E. Otto Höhn.

DOCTOR KANE OF THE ARCTIC SEAS. By George W. Corner. *Philadelphia: Temple University Press, 1972. 6⅞ x 9¾ inches, 306 pages, illustrations and maps. $10.00.*

This book by a very distinguished medical man, a Fellow of the Royal Society, who happily had access to Kane family papers, gives a new insight to the brief career of a heroic American figure. For Kane, the initiator of United States arctic exploration in the direction of the Pole, became a national hero, as the fantastic demonstrations at his funeral proved, comparable to those at the obsequies of Lincoln and Robert Kennedy. For in 1857 the revolutionary leaders were long dead, and the civil war was yet to come.

Dr. Corner in the first quarter of the book describes the explorer's early life: how, stricken by rheumatic fever with associated cardiac damage, he switched from engineering to medicine, became a naval surgeon (though invariably seasick) and travelled to Macao with the U.S. government's first and not very successful mission to China. And how he returned from the Far East visiting Egypt and Europe, then to fight and be dramatically wounded in his country's war with Mexico.

Then in 1850 Lady Franklin appealed to President Taylor asking for assistance from the United States in the search for her husband's missing expedition. The President and his Secretary of State approved, but Congress, sparked by Senator Jefferson Davis (who was later to crave certain help from Britain!) hesitated, and it was only through the financial generosity of Henry Grinnell that the U.S Naval Expedition under Lieutenant de Haven got under way. Kane was appointed surgeon, and it is fascinating to read Corner's account of his journey from Mobile Bay, Alabama, on receipt of a telegram (a newly established device) to New York by varied stage-coach rail and steamboat in seven days. De Haven's ships were present when the first traces of Franklin's 1845/46 wintering were found at Beechey Island, but then suffered a winter's imprisonment and drift in the ice down Baffin Bay.

But this voyage, of which he was the chronicler, was enough to inspire Kane, dreaming of "an open Polar Sea", to launch his own venture, and the major part of the book describes the expedition which he commanded in the brig *Advance* from 1853 to 1855: the two winters in northwest Greenland, the push furthest north into Kane Basin, the secession of much of his crew, and the final retreat to Upernavik.

Corner also tells the curious story of Kane's romantic attachment to the medium Maggie Fox, an attachment which caused him much emotional anguish during the preparation of his expedition.

An expedition leader needs vision, skill, strength, and tact. Kane certainly had the vision and developed skills, but his strength was slight and his tact negligible. A Philadelphia aristocrat, raised in a tradition of justice and decent behaviour, he found himself commanding a very mixed group including some unruly scum from the New York waterfront, and his "democratic" attempts to cope brought little but more trouble on his head. But despite all the physical and human tribulations of 1854, when it came to the 80-day retreat by sled and small boat, this was carried out with great efficiency and lack of quarrelling. And his own physical efforts were astonishing. If only this chronic invalid could have stayed in the north . . .

On his return to the States in 1855 he plunged into the writing of his expedition account, which became a huge best seller. Poor Kane — like many another explorer he found the reporting more exhausting than the execution, the heat of Philadelphia's summer as he wrote