from 3,100 calories in the desert (92°F.) to 4,900 calories a day in the Arctic (−30°F.). This very large difference in caloric intake cannot be explained in terms of changing basal metabolic rates (*2*), which vary at the most by 20 per cent between arctic (Greenland) and tropical (Java) environments (equivalent to only 400 calories/24 hours); nor can it be explained in terms of difference in body size (Table 1) or in terms of different activities, since the ground troops carried out much the same tasks in all environments. We have no crucial evidence to decide this latter point, but we believe that the caloric expenditure for a given task is greater in cold than in warm climates because of the hobbling effect of arctic clothing and equipment. In addition, more heat is required in cold than in warm environments to maintain thermal equilibrium.

TABLE 1

Body Weight, Caloric Consumption, and Ratio of Protein, Fat, and Carbohydrate Eaten by Representative Groups of Ground Troops in Different Environments

Place and troops	Environment	Average body weight (kg.)	Average caloric intake/man/day	Percentage of calories provided by: Protein	Fat	Carbohydrate
Canada, mobile force "Musk Ox"	Arctic and subarctic	73.0	4,400	11	40	49
U. S. A., ground troops	Temperate	69.0	3,800	13	43	44
Colorado Rockies, infantry	Temperate mountain (9,000 ft.)	69.5	3,900	13	34	53
Pacific Islands, ground troops	Tropics	70.0	3,400	13	33	54
Luzon, infantry	Tropics	65.5	3,200	12	34	54

Table 1 demonstrates that, regardless of environment, the percentage of proteins voluntarily chosen from the rations was practically constant in all environments, and that even in the tropics the percentage intake of protein and fat was "high" by traditional criteria and not much different from what it was in the Arctic.

The chief practical implications of these data are that the same general types of rations can be provided for ground troops regardless of environment, whether cold or hot, and that greater quantities of food are needed to feed men in cold weather than in hot.

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The Terminology of Pollination

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PLANT BREEDERS INTERESTED IN pollination work realize the variations relative to the application of the terms designating the expressions of pollination. It is not the purpose of this brief discussion to draw conclusions at the present time or to offer a cure for the ills which will be apparent, but simply to present facts.

The common conception of pollination in the angiosperms is the transfer of pollen from the anther to the stigma of a flower. There are, of course, exceptions to this general conception. For example, in horticultural usage alone, particularly with reference to orchard fruits, the term is sometimes applied in a general way to designate all the influences concerned in the setting of fruit; or pollination may be concerned with both the transfer of the pollen to the stigma and its subsequent germination thereon; while again, both pollination and fertilization have been used synonymously to imply application of pollen to the stigma. We are concerned with a brief presentation of the variability in use of the most common terms—self, close, and cross—used in delimiting the process of pollination, rather than with a discussion of the numerous terms which designate the ramifications of these general expressions and are based upon the great variety of structures and mechanisms among flowers.

Much confusion has been brought to the common conception of pollination as a transfer of pollen from anther to stigma, because structural, genetic, and mechanical aspects of the phenomenon have all been considered. This state of affairs pertains more to the common terms, such as self, close, cross, and closely applied terms which designate general types of pollination, than to specialized terminology as exemplified by the classifications of Knuth (*Handbook of flower pollination*, Vol. I, 1906). Horticulturists and botanists in general seem to differ as to the exact definitions of the terms self- and cross-pollination, usually defining them from a "mechanical" viewpoint, namely, a transfer of pollen. But in their *use* of the term the ideas of structure and genetics are brought in which extend this conception *beyond* the single act of transfer.

From one point of view, self-pollination is the transfer of pollen from the anther of a flower to the stigma of the same flower, and cross-pollination is pollination between the anthers and stigmas of different flowers on the same plant or between flowers on different plants of the same variety or different varieties. From another viewpoint, it would be considered that self-pollination is the transfer of pollen from one flower to the stigma of the same flower, to the stigma of another flower on the same tree, or to the stigma of a flower on another individual of the same variety. Likewise, in this sense, cross-pollination would involve the pollen of one variety and the pistil of another. Pollination within both monoecious and dioecious forms of the same variety or species would always be self-pollination, from one viewpoint; while dioecism would always be, and monoecism would sometimes be, cross-pollination in a typically different viewpoint. Only intraspecific pollination is reviewed here, since interspecific pollination is considered as cross-pollination in all cases.

Although these two general viewpoints are in evidence, the situation is confused by the continued appearance of definitions and usages of the terms self- and cross-pollination, which suggest different degrees of variation between the above two delineations. For example, self-pollination is the conveyance to the stigma of pollen from the anthers of the same flower or from a flower on the same plant, while cross-pollination involves pollen from a flower on another plant of the same or a different variety. Again, self-pollination is the transfer of pollen from the anther of a flower to the stigma of the same flower, while cross-pollination takes place between flowers of the same plant, or between flowers of different plants of the same variety.

Close-pollination has been frequently referred to in conjunction with self-pollination and, likewise, has also assumed different meanings. Whereas self-pollination is limited completely to an individual flower, close-pollination designates pollination involving different flowers on the same plant; yet again, exactly the reverse definition has been given. Close-pollination may also be extended by the same worker to mean pollination which takes place within an individual flower, between flowers on the same plant, or between flowers on the same plant and flowers on different plants of the same variety. Self- and close-pollination are also used synonymously in relation to the complete occurrence taking place within an individual flower. The term close-pollination has likewise been used to refer to the fact that in some plants pollination occurs before the buds open. Lastly, the term "self" may not be used at all, being replaced entirely by "close," which refers in such cases only to pollination between the anther and stigma of the same flower while cross-pollination refers to all other forms.

Open-pollination is used frequently in horticultural literature in a very broad sense to include uncontrolled pollination between anthers and stigmas, irrespective of their relations to each other—that is, whether they are in the same flower or in different flowers of the same or different variety. This term, therefore, is intended to be used in relation to artificial pollination as contrasted to natural pollination, and hence should not be included in the types discussed in preceding paragraphs. To do so would confuse the issue still more. Interpollination is used less frequently, and has been designated as pollination between closely related species or subspecies or between flowers of a cluster on the same plant.

In spite of the general confusion in terminology, the phenomenon could be considered from any of three viewpoints:

(1) Pollination defined in its original form as the transfer of pollen from an anther to a stigma would not necessitate the designation of the relative positions of anthers and stigmas. If it is considered in this manner, the single term *pollination* would adequately describe all types.

(2) The terminology could be enlarged to distinguish between the transfer from anther to stigma in the same flower and from the anther of one flower to the stigma of another, regardless of any hereditary relationship between flowers concerned. On this basis, the two terms *self-* and *cross-pollination*, respectively, would serve.

(3) However, we might take into account not only pollination within an individual flower and between different flowers, but also whether these different flowers are of the same clone, the same strain, the same variety, or the same subspecies or species. This would necessitate four major categories of pollination instead of one or two: (1) within an individual flower, (2) between flowers of the same plant, (3) between flowers of different plants of the same variety (where varieties are recognized) or species, and (4) between flowers which are on plants belonging to different varieties (either clonal or pure line) or species. In regard to (3), distinctions must be made between plants of (a) a variety whose population is made up of clones, such as the horticultural clones of pear, peach, apple, almond, and the like, and (b) a variety whose population is composed of sexually propagated individuals, such as many floricultural plants (aster, sweet pea).

Although it is known that inconsistencies do exist in the conception of what constitutes the different expressions of pollination, the extent of such inconsistencies is perhaps not fully realized. If we have done no more than present this situation and the facts in a more organized manner, this discussion has served its purpose.