period effect depends upon the identification of the processes concerned. The major scientific progress reported at this conference came about largely because workers were able to identify and measure physiological organizing processes, with the result that periods of rapid organization and consequent critical-period effects could be easily recognized.

The proceedings of the conference are being edited by S. Kazda and V. H. Denenberg and will shortly be published by Butterworths (London) and Academia (Prague).

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Systematics Workshop

Those interested in the future of systematics have been concerned because little emphasis is being given to the training of competent systematists by many universities. Indeed, several universities are said to no longer consider a taxonomic study worthy of a Ph.D. candidate. In addition, many present systematists are little versed in newer methods of determining genetic relationships. Proceeding apace with this is the fact that the number of systematists who are competent to deal with more than a minor part of any large major group of animals is small indeed. As a consequence of these facts, the responsibility for maintaining systematic knowledge and training systematists has in recent years shifted increasingly to the larger museum centers, one of the most important being the U.S. National Museum of the Smithsonian Institution. It was then entirely appropriate that the Smithsonian sponsored last summer a 3-week workshop in systematics, chiefly aimed at young professors who are not connected with a university which is now a major center in systematics. Twenty-five participants from 22 universities and colleges heard about new methods and results in systematics from 15 leading practitioners, chiefly from outside the Smithsonian, in morning sessions, and worked at the Museum with its resident staff in their specialties in the afternoons.

Two chief highlights of the workshop were in the contrasting of methodological bases for determining classifications of organisms, and in contrasting methods for obtaining systematic data. The sequence of events in genetic changes was emphasized by H. R. Stalker who determined the sequence of chromosomal inversions in *Drosophila*. This is a cladistic (or branching) approach toward forming a classification and markedly differs from the methodology of phenetics which emphasizes the degree of similarity independent of the way in which similarity was achieved.

A good example of new phenetic data was provided by C. G. Sibley who summarized his thousands of pieces of data on proteins in bird muscle and eggs. The protein data were treated in the same way as the more classical morphological data; a classification was derived based on degree of similarity. This phenetic approach was carried to its logical endpoint by R. R. Sokal who used computers to add up the number of characters held in common among taxa and then applied statistical techniques as a means to quantify degrees of similarity. The assumption is that those taxa with more characters in common are (probably) more closely related to each other than to others. The lack of concern by Sokal and other pheneticists for determining phylogenetic relationships (as opposed to a general classification) reduced the effectiveness of this approach for those whose chief interest in systematics is evolutionary history.

Very significant taxonomic data have come in the past decade from the field of animal behavior. For example, the extremely difficult questions surrounding field cricket systematics were greatly aided by analysis of cricket calls. At the workshop, R. D. Alexander told of this work, which led to a discussion of the possibility of sympatric speciation. Again, the fresh light thrown on this subject by behavior—this time from analysis of breeding periods—showed that ethology is of great importance for systematics.

As zoologists become biochemists, paleontologists are gradually filling the niche of those whose chief interest is the natural history of a major group of organisms. This has been generally true for several years for some major taxa (Foraminifera, Ostracoda, and some extant groups of Mollusca), but is becoming increasingly widespread (Dinoflagellata, Brachiopoda, and Ectoprocta). Indeed one of the workshop's most interesting presentations was by C. Ray who showed how reasonable hypotheses about the life habits of fossil mammals could be derived from data based on living species. The often-heard complaint that an inadequate fossil record prevents phylogenetic or ecologic analysis is often only an excuse for not making use of the vast amount of paleontological material which can be interpreted.

In summary, the workshop benefited the field of systematics in several ways. Most directly assisted were the participants who were brought up to date on newer methods, whose analytical powers were well tested, and whose students should be better trained. The Smithsonian benefited because systematists in general were made increasingly aware of its broad and fundamental interests in the development of their science. All who attended hope that similar workshops will be held in the future, possibly next time focusing attention on botanical systematics.

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Human Histocompatibility Locus HL-A

Ten years have passed since the first human leukocyte isoantigen was recognized by in vitro techniques. The significance of that discovery was not fully appreciated until several years later, and only recently has it been proved that the first antigenic specificity, Mac, was one of many components of one very complex system.

Increasing numbers of investigators have become attracted to the study of leukocyte antigens because these antigens are also present on a wide variety of tissue cells. On the tissues, a number of these factors serve as, or are closely associated with, transplantation or histocompatibility antigens and are implicated in graft rejection. The investigations have been greatly accelerated by the discovery that the isoantibodies to leukocytes were present in serums from multiparous women. The introduction of simple computer programs made possible the comparison of large numbers of serums, revealing systematic differences and similarities.

Many leukocyte isoantigens have now been detected. From a consideration of the intricate relations among ten dis-

crete antigens in a random population, the concept was derived that these factors were components of a single complex system. Similar conclusions were drawn from linkage studies. In certain families, including those recently studied at the Torino workshop (Torino, Italy, June 1967), the patterns of the isoantigens in the children's leukocytes can be explained on the basis of the inheritance of an "allelic" unit of inheritance from each parent. Further confirmation has come from a comparison of serologic findings with survival of experimental skin grafts exchanged between siblings and from culture reactions. Other isoantigenic systems independent of the main locus have been described. In some of these, the antigens are widely distributed on the tissues; in others, the antigens appear to be restricted to a single cell lineage.

Several names have been proposed for the major locus: Group IV, after the first leukocyte "group" to be detected; Hu-1, for the association shown among ten antigens; Du-1, from the relationship of three complex subgroups; LA, because of the intricate relationship among the four antigens of the LA system; TO, for the antigens detected in Torino; and LC, emphasizing the expression of these antigens on the lymphocyte. Some investigators have used simple numbers. Yet another nomenclature was devised in which each antigen was identified by its cellular or tissue distribution, for example, on platelets or granulocytes, and so forth.

A World Health Organization (WHO) committee is being formed to discuss and formulate terminology. As an interim measure, the investigators listed below, who agreed as a result of discussions held at a meeting at Williamsburg, Virginia, in November 1967, suggest that the major locus be designated HL-A. We hope that this designation will be generally accepted.

Investigators accepting the proposed terminology HL-A for the major locus were: F. H. Allen, D. B. Amos, H. Balner, J. R. Batchelor, W. Bodmer, R. Ceppellini, J. Dausset, V. Eijsvoogel, C. P. Engelfriet, P. Ivanyi, F. Kissmeyer-Neilson, P. Lalazari, S. Lawler, J. J. van Loghem, R. S. Metzgar, V. Miggiano, R. D. Owen, R. Payne, N. Rogentine, J. J. van Rood, P. Terasaki, R. Walford, Ch. M. van der Weerdt, and C. M. Zmijewski.

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