REPORTS

COMMITTEE ON ANATOMICAL NOMENCLATURE

DURING the interval between the two world wars serious efforts were made to secure international revision of anatomical nomenclature. The Basle Nomina Anatomica, which was in official use in the Germanic countries, in Japan and in the United States, obviously required revision. This was undertaken by the Anatomische Gesellschaft, and a somewhat radical revision known as the NK and finally as NA was adopted for use in Germany. Meanwhile, the Anatomical Society of Great Britain and Ireland adopted its own revised nomenclature in English (BR), based largely on the old British tradition and very different from the BNA and NA. In the hope of avoiding further national separatism, an international commission on nomenclature was set up in 1936. This commission adopted the NA system as a basis for revision and requested suggestions for its work, which was to be considered for adoption at an International Congress of Anatomists in 1939 or 1940.

A committee of the American Association of Anatomists, under the chairmanship of Professor C. M. Jackson, gave careful consideration to this question for three years, and finally in 1937 submitted to the International Commission detailed proposals for a new nomenclature. These proposals took the form, as required, of suggestions for improvement of the NA; but they were based upon earnest consideration of both the German and British proposals as well as of the American view-point, and it was hoped that the American revision would help toward a truly international agreement. The American committee carefully avoided setting up this revision as a national standard, prior to international consideration, as unfortunately the British and Germans had done. Its report was therefore never published and exists only in manuscript.

The outbreak of war in 1939 stopped all such international efforts. Meanwhile the Germans and Japanese have adopted the NA; the British have adopted the BR; in Latin countries various vernacular nomenclatures largely based on the French tradition are still in use; and the United States anatomists alone continue officially using the BNA.

The present is hardly the time to dream of international action toward preventing this chaos in nomenclature; but it seems a clear duty that the American Association of Anatomists shall do what it can to preserve the valuable work of its committee for future use. It should be prepared to guide its own members, and others in our country who use anatomical terminology, through this unsettled time; and to help and, if necessary, lead in re-establishing an international nomenclature as soon as possible.

To that end the association, at its meeting in 1942, appointed George W. Corner chairman of its Committee on Anatomical Nomenclature to succeed C. M. Jackson, retired, with authority to reconstitute the committee. This has been done as indicated below.

All who are interested in these problems are invited to communicate with the committee.

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SPECIAL ARTICLES

THE ANTIGENIC PROPERTIES OF NATIVE AND REGENERATED HORSE SERUM ALBUMIN[1]

THE denaturation of serum proteins by such organic compounds as urea, or guanidine hydrochloride, is a pseudo-reversible reaction. If horse serum is denatured by concentrated urea solutions, and urea removed by dialysis, a water-soluble protein can be recovered which resembles the original, native protein in molecular size and shape, but differs from it in conditions of crystallization and yield,[2] in electrophoretic mobility on the alkaline side of the isoelectric point,[3] and in its response to the proteolytic action of trypsin.[4] This indicates that the apparently reversibly denatured, or "regenerated" protein, although akin to the native in size, shape and surface properties, is devoid of the specific intrinsic structure of the latter and, therefore, in a denatured state.[5]

Investigation of the immunological properties of native and regenerated serum albumin led to the discovery of fundamental differences in the antigenic

[1] This work was supported by the Rockefeller Foundation and by the Lederle Laboratories, Inc.

[2] H. Neurath, G. R. Cooper and J. O. Erickson, *Jour. Biol. Chem.*, 142: 249, 1942.

[3] D. G. Sharp, G. R. Cooper, J. O. Erickson and H. Neurath, *Jour. Biol. Chem.*, in press.

[4] F. Bernheim, H. Neurath and J. O. Erickson, *Jour. Biol. Chem.*, in press.

[5] H. Neurath, G. R. Cooper and J. O. Erickson, *Jour. Phys. Chem.*, 46: 203, 1942.

activity of these two fractions, as revealed by the response to antibody formation they elicit. In these experiments, two groups of large rabbits, of between 4 and 5 kg body weight, were given successive, intravenous injections of native and regenerated horse serum albumin, respectively, over a period of not less than four weeks. Antibody titer of the rabbit sera was determined by the optimal proportion method of Culbertson.[6] In several cases, antibody content was also determined by the method of Heidelberger and Kendall,[7] as well as by quantitative comparison of the electrophoretic patterns of normal and immune sera.[8]

Although individual variations in the response to antibody formation are apt to be great, nevertheless, with eleven animals that have been tested, the antibody titer of the sera of rabbits immunized with the regenerated serum albumin was, on the average, only 10 per cent. of that obtained by immunization with the native protein. In a typical pair of experiments, 1 cc of an anti-native protein rabbit serum was found to combine optimally with 1.23 mg of the homologous antigen whereas 1 cc of an anti-regenerated protein rabbit serum combined optimally with only 0.13 mg antigen.

While the regenerated protein is thus seen to possess a greatly reduced capacity to incite antibody formation, the immunological specificity of the native protein was not impaired by the regeneration process. This is borne out by the finding that native and regenerated protein not only exhibited strong cross reactions when tested with the corresponding antisera, but, in all but two cases, were actually immunologically equivalent. Immunological equivalence is defined, according to Marrack, as: "Two antigens A and B will be said to be 'equivalent' when the antiserum to A reacts in the same titer with both A and B, and vice versa."[9]

Preliminary measurements indicated the regenerated horse serum albumin to be completely non-antigenic in sheep, even when administered in fairly large amounts.

The present findings suggest that native and regenerated serum albumin differ from each other in antigenic activity but not in antigenic specificity, and that the antigenic activity of the native protein resides primarily in the very structural features that are altered or destroyed during the regeneration process.

This work is being extended in various directions so as to include the action of several types of denaturing agents on the albumin fraction of certain normal sera, and on the globulin fractions of normal and immune sera. A full account of the present findings will be published elsewhere.

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QUANTITATIVE INTERNEURONAL RELATIONSHIPS IN THE HUMAN SPINAL CORD[1]

BODIAN[2] has recently reviewed the problems in the field of synaptology, and to his excellent summary the reader is referred for introductory notes and bibliography. Among the problems requiring attention is that of ascertaining on a quantitative basis the interrelationships of the various cell groups in the human spinal cord. The determination of these values

TABLE 1

INTERNEURONAL RELATIONSHIPS IN THE HUMAN SPINAL CORD

		Source of Adjacent Terminals (Number and per cent. of total for region)				
Cell column	Number of adjacent boutons	Dorsal root	Substantia gelatinosa	Sensory and internuncial	Subcortical nuclei	Cerebral cortex
Sensory and internuncial (5,440,000 cells)	676,740,000	20 per cent. (135,348,000)	14 per cent. (94,743,600)	50 per cent. (338,370,000)	10 per cent. (67,674,000)	6 per cent. (40,604,000)
Nucleus dorsalis (188,600 cells)	65,632,800	65 per cent. (42,661,320)	10 per cent. (6,563,280)	15 per cent. (9,844,920)	10 per cent. (6,563,280)	0 per cent.
Intermediolateral (1,023,000 cells)	124,806,000	0 per cent.	50 per cent. (62,403,000)	40 per cent. (49,922,400)	10 per cent. (12,480,600)	0 per cent.
Somatic efferent (1,456,000 cells)	925,503,000	0 per cent.	5 per cent. (46,275,150)	65 per cent. (601,576,950)	20 per cent. (185,100,600)	10 per cent. (92,550,300)
Number and per cent. of total boutons contributed to cord cells from each source	1,792,681,800	178,009,320 (9.5 per cent.)	209,985,030 (11.8 per cent.)	999,714,270 (55.8 per cent.)	271,818,480 (15.2 per cent.)	133,154,700 (7.5 per cent.)

[6] J. T. Culbertson, *Jour. Immunol.*, 23: 439, 1932.

[7] M. Heidelberger and F. E. Kendall, *Jour. Exp. Med.*, 61: 559, 563, 1935.

[8] A. Tiselius and E. A. Kabat, *Jour. Exp. Med.*, 69: 119, 1939.

[9] J. R. Marrack, "The Chemistry of Antigens and Antibodies." London, 1938.

[1] Read before the American Association of Anatomists, New York, N. Y., April 2, 1942.

[2] David Bodian, *Physiol. Rev.*, 22: 146–169, 1942.