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The Commemoration of the Meckel Bicentennial: Bozeman 1982

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> Under close scrutiny the perogative of self-intelligibility thus attributed to present time is found to be based upon a set of strange postulates. In the first place, it supposes that, within a generation or two, human affairs have undergone a change which is not merely rapid, but total, so that no institution of long standing, no traditional form of conduct, could have escaped the revolutions of the laboratory and the factory. It overlooks the force of inertia peculiar to so many social creations.
> —Marc Bloch
> *The Historian's Craft*

The gracious and proper practice of acknowledging important contributions made by predecessors in a given field of endeavor endows the present with the gift of historical perspective. Yet a certain reluctance to trace the transmutation of seminal ideas and to acknowledge the works of their intellectual ancestors characterize workers in many fields of science.

Nowhere is this more evident than in the field of embryology whose intellectual history rivals that of physics, chemistry, and mathematics. The rich intellectual tradition of embryology as it developed in the Western world includes powerful thinkers like Aristotle, William Harvey, Carl Ernst von Baer, Johannes Müller, Wilhelm Roux, Theodor Boveri, and Hans Spemann, to name only a few. Their working methods, centering upon a mechanistic and morphological approach, have given way to physiological, biochemical, endocrine, and molecular-biological analyses. The abandonment of the older methodology did create a gap in the historical picture of embryology and it did incur an heuristic penalty.

So many other younger workers in the biomedical sciences were trained in an atmosphere of presentism that they lost the ability to make important connections between embryological and anatomical-physiological developments. Rich irony in-

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deed, since both history and embryology study what Aristotle called "phenomena coming into being." For example, except for the tautological response "Why, it arose embryologically," most anatomists have no idea of how the development of complex structure is coordinated prenatally.

An excessively presentist orientation has led to the virtual loss of one of the most seminal ideas ever contributed by embryologists to Western biology. This concept, now about two centuries old, is that of the developmental field. The intellectual partrimony of anatomy is that much poorer for the loss.

Johann Friedrich Meckel the Younger, one of the giants in field theory, is now nearly forgotten, as is his work in comparative anatomy, embryology, and teratology. In addition to his fine scientific work, Meckel should be remembered with gratitude and honor at the present time. As Dr. Siedler pointed out in his presentation, Meckel's pioneering work in teratology in one stroke provided a rationale that removed the stigma of genetic deformity. All present day efforts to improve the quality of life and opportunity for the physically and mentally handicapped lead back to his efforts.

Alexander von Humboldt, perhaps the most widely informed scientist of his day and a contemporary of Meckel, called him the "greatest anatomist of our era." Johannes Müller, just a generation later, noted that "above all J.F. Meckel has produced unquestionably the best and most complete observations in human embryology." Rudolf Virchow, in the middle of the last century, summed up Meckel's contributions to teratology: "It was primarily Johann Friedrich Meckel . . . who . . . took up the embryological investigations begun by Harvey, Haller, Hunter, extending them to the development of individual organs and following these into extrauterine life. In doing so he encountered those numerous anomalies of development which bring about congenital malformation . . . . Now Meckel discovered that even here an accordance with law was to be found; he showed how, under certain circumstances, normal development might succumb to abnormal tendencies . . . . Thus congenital malformations became comprehensible and teratology (the study of monstrosities) became a new member of the array of anatomical subjects. It is truly no exaggeration to say that the most obsure field in pathology was first illuminated for natural science by Meckel." (All quotations from Clark, OD: The contributions of JF Meckel, the Younger to the science of teratology,[J Hist Med All Sci 24:310–322, 1969].

A more complete analysis of Meckel's contributions to Western biology will follow. However a brief biography is in order.

JF Meckel, the Younger, was born on October 17, 1781 in Halle, third generation of an illustrious family of physicians and anatomists whose anatomical discoveries are recalled in eponymy. Meckel's (the sphenopalatine) ganglion was discovered by JF Meckel the Elder (grandfather). Meckel's father, Phillip Friedrich, was honored for his studies of the inner ear. Meckel the Younger studied under his father, and under Johann Christian Reil and Georges Cuvier whose epic multivolume *Leçons d'Anatomie Comparée* Meckel translated with extensive notes into German (1809). Later Meckel wrote his own volume *System der vergleichenden Anatomie.* Meckel was Professor of Anatomy and Physiology at the University of Halle between 1806–1833 when he published his four volume text *Handbuch der menschlichen Anatomie* (1815–1820). His doctoral thesis had been on congenital heart disease. While founding and editing the *Deutsche Archiv für die Physiologie* (and the short-lived journal for

major and minor anatomical varieties), he produced his magisterial *Handbuch der pathologischen Anatomic* (1812–1818). In addition, he published a 98–page *De duplicatate monstrosa commentarious* (1815), and the *Tabulae Anatomico–Pathologicae* in four volumes (1817–1826). He also wrote dozens of other papers, of which the one on the familial syndrome now called the Meckel syndrome [Opitz JM, Howe JJ (1969): The Meckel syndrome, BD:OAS 5(2):167–179] is one of the most renowned. Meckel was a prodigious worker, brilliant observer in spite of the crude methods then available to him, sovereign master of all knowledge in his field, admirable linguist (German, Latin, French, English, and Italian), respected journal editor, and widely travelled lecturer. Though considered to some extend a *Naturphilosoph*, Meckel militantly insisted on accurate observation and the formulation of useful hypotheses. In the preface to the *Deutsche Archiv für die Physiologie* (1815) he stated: "The purpose and plan of this journal is dedicated primarily to observation and experimentation, in that I am firmly convinced that only in this way can science gain and continually be furthered." A year later, in a work on the irregular distribution of certain arteries, he added that observations were to be a means to an end, ie, in the formulation of basic biological principles. Honored in many countries, Meckel died at the age of 52 years having accomplished more in one lifetime than generations have dreamed about before or since. In honoring the memory of Meckel we honor ourselves.

In honoring Meckel we also draw together rich intellectual traditions in history and in biology. As William Harvey stated it: "Nature is nowhere accustomed more openly to display her secret mysteries than in cases where she shows traces of her workings apart from the beaten path . . . ." The historical recovery of the concept of the developmental field and associated pleiotrophic developmental phenomena is in a deep sense an historical act. It is at the same time an important biological insight. Hence Meckel provides the opportunity to hinge these time–dependent perspectives.

The First Meckel Symposium was suggested by John M. Opitz to commemorate the bicentenary of Meckel's birth. He found support from the staff at Shodair, Montana State University, and Alan R. Liss, Inc. The program that resulted was the outcome of several meetings and considerable correspondence. Committees on finance, nominations, local arrangements, and program implemented his ideas.

A guiding theme incorporating a celebration of history and biology developed from the several discussions. A Meckel Award would be given for outstanding work in developmental genetics. In this way Meckel's own career would provide a basis for the program. The award would consist of a gold medal of 2 ounces Troy weight. It would be cast by Professor Richard Helzer of the Department of Art at MSU. It would be accompanied by a Meckel Prize of $1,000 to be presented by the Vice–President of Research, Professor John Jutila of MSU. Following the presentation of the award at a noon ceremony, the Distinguished Meckel Scholar would deliver an oration on that aspect of his or her work pertaining to the bicentennial theme

The program itself would consist of a series of sessions to be held for one day on the campus of MSU. After introductions by Shodair, University, and State officials, the initial address would be historical in nature and it would examine salient aspects of Meckel's life and work. The award ceremony would follow. The afternoon would be devoted to scientific papers. At least one of these papers would be presented by a prominent student of the recipient of the Meckel award. It was the program

Fig. 1. Sewall Wright with favourite research animal.

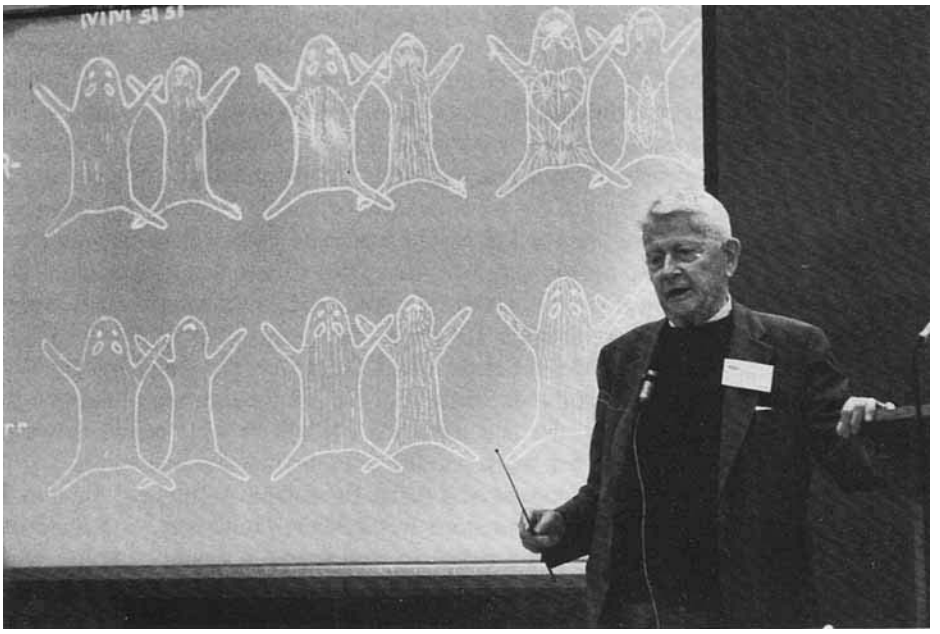

Fig. 2. Sewall Wright delivering the Meckel oration.

committee's wish that continuity both in the intellectual and in the personal sense would be apparent throughout the day.

The program itself exceeded the expectations of the program committee. It was a beautiful Saturday in October, a fit day to celebrate Meckel's natal day two centuries earlier. Dr. Eduard Seidler commenced the program with a masterful discussion of Meckel's life and work. Dr. Sewall Wright, already so loaded with honors, received the Meckel Medal and Award (Figs. 1, 2). He was in rare form. One of the students, Dr. Elizabeth S. Russell, addressed the group concerning her work in mammalian development. Dr. Duane C. Kraemer concluded the program with description of his work on embryo transplants. The whole was a judicious blend of humanistic and scientific research and judgment. A great landmark in the history of scientific endeavor has again been illuminated.