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Ernest A. Spiegel
A Volume Commemorating the Fiftieth Anniversary of His Graduation

In 1960 when the author assembled a group of notables to pay tribute commemorating Dr. E.A. SPIEGEL’s 65th birthday [J. nerv. ment. Dis. 130: 437, 1960] he felt that the end point of his beloved teacher’s career had been reached. Time proved otherwise. Nearly ten years later again outstanding workers in the fields of neurology, neurophysiology, neuropathology and neurosurgery offered their contributions to this volume dedicated to this illustrious physician and neurophysiologist.

He was born in Vienna in 1895, the son of a physician who taught him medicine and the ethics of the profession at a very early age. As a small boy he quickly learned the art of bandaging which he practiced on his father’s patients. He was graduated in medicine in 1918 receiving his degree from the University of Vienna. His interests were early directed to the study of the nervous system, for while still a student he worked at OBERSTEINER’s Neurological Institute. The kind and gentle OBERSTEINER was quick to recognize his potentials, so that in 1918, the year of his graduation, he was asked to become his assistant. He continued his neurological studies at the Institute for the next 12 years, later under MARBURG. Simultaneously he worked with KARPLUS at the Policlinic in Vienna. At the early age of 29 he received the `venía legend? and thus became a member of the faculty of his alma mater. He applied himself not only to neurological research and experimentation but also to a tremendous amount of clinical studies, particularly since he came in contact with many ravages of influenza known then as the `Spanish flu'.

In 1930 he accepted the position as Professor and Head of the Department of Experimental and Applied Neurology at Temple University School of Medicine in Philadelphia. A research foundation initiated by the late D. J. MCCARTHY and a recommendation by the late J. C. UASkiw one of his many devoted American post-graduate students made the position possible notwithstanding the fact that numerous other promising offers were available. In 1966 he became Emeritus. And so it came to pass that he devoted over 50 years of his life, first in Vienna, then in Philadelphia, and lately in Miami where he directs research at the National Parkinson Foundation to tireless work in the field of scientific research.

Space does not permit a complete enumeration of his publications (over 420) or a tale of the many wonderful hours the author enjoyed by
clinging to his coat tails’. Sometimes the road he traveled was rough and rocky but in the end most rewarding. Only some of the highlights of his career will be mentioned. He published five monographs: `Muscle Tone' [9] in 1927; `Centers of the Autonomic Nervous System' [10] in 1928; `Experimental Neurology' [11] in 1928; `Neurology of the Eye and Ear', with J. SoMMER (German Edition in 1931 [31], Spanish Edition in 1937, English Edition in 1944 [32]); and `Stereoencephalotomy' [49] in 1952 and in 1962 with H. T. Wvcts. He has also held the editorship of `Confinia Neurologica' (30 volumes) and of `Progress in Neurology and Psychiatry' (23 volumes). While pursuing studies in comparative anatomy at the Obersteiner Institute he discovered and described a group of organ cells on the undersurface of the psalterium and fornix respectively, which he named the ganglion psalterii [8], later described by Purnlm [6] and PINES [5] as the intercolumnar tubercle and subfornical ganglion respectively. In contrast to the concept prevailing at that time, that the central nervous system is only secondarily affected in generalized anaphylactic shock, SPIEGEL was able to demonstrate local cerebral reactions in this condition [28]; at a later period the existence of localized allergic reactions of the central nervous system became generally accepted. By injecting small, intravenously ineffective extracts of various endocrines into the third ventricle of rabbits, an action upon hypothalamic vasomotor centers, particularly a depressor effect of pituitary extracts, was demonstrated in 1924 [30]. The same effect was later described by CUSHING [2] in man.

A series of systematic studies dealt with the influence of the labyrinth upon the vegetative nervous system, particularly the vascular system. A fall of blood pressure [22, 23] and an impairment of the cerebral circulation [25] were demonstrated and analyzed, a finding that was later confirmed by numerous investigators. Of his numerous studies on the physiology and pathology of the central connections of the labyrinth, the demonstrations of a cortical projection partly to the temporo-parieto-occipital border and partly to the frontal lobe by strychninization of the cortex and by electrographic studies [13-15, 24, 39] seem the most outstanding. When the temporo-parieto-occipital border of cats was sensitized to afferent impulses by localized application of strychnine, labyrinthine stimulation by rotation elicited epileptiform convulsions, apparently because the impulses entering this area spread to motor areas. Further electrographic studies indicated that labyrinthine impulses partly entered the temporal lobe and partly the frontal lobe. The finding that the temporal lobe receives labyrinthine impulses seems to be applicable to man, since vertigo was observed in

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temporal lobe tumors more frequently than in other types of brain tumors [20]. RENFJELD's [4] more recent observations of vertiginous seizures, elicited by stimulation of the temporal lobe on the operating table, are in full agreement with SPIEGEL'S findings.

In recent years the reticular formation has aroused much interest. It has been more or less ignored that as early as 1925, preceding MAGOUN's [3] work in the region by two decades, SPIEGEL showed that the rigidity of decerebrate cats is not completely abolished by lesions of the vestibular nuclei, but that the lesions had to encroach upon the reticular formation of the rhombencephalon in order to induce complete flaccidity [21]. Historically-minded readers will find that as early as 1927 SPIEGEL had clearly outlined the importance of the reticular formation as a supraspinal reflex center of the static innervation in his monograph on muscle tone [9], as well as in BETHE's easily available `Handbuch der Physiologie' [12] two years later.

Regarding studies on the central part of the autonomic system, one can mention briefly and in passing SPIEGEL'S experiments demonstrating that the pyramidal tract carries corticofugal fibers to the vegetative system [27], and that the striatum influences the liver [38].

Basic electroencephalographic studies were begun by SPIEGEL in RothBERGER's Vienna Laboratory, shortly before his departure to this country. Continuing these studies in Philadelphia, he was able to show, in 1936, that the electrocorticogram and the electrothalamogram may be widely independent of each other, that rhythmic discharges may be lead off from the thalamus of cats after decortication, and conversely, that rhythmic discharges can be obtained from the sigmoid gyri after interruption of their connection with the rest of the brain [16, 17]. Similar findings were made independently by BREMER [1] somewhat later on the occipital cortex.

An essential part of his professional contribution is the result of the joint efforts of Doctor SPIEGEL and his wife, the physicochemist MonI SPIEGELADOLF, who herself is widely known for her monographs on globulins [59] and on `X-ray Diffraction Studies in Biology' [60] as well as for her studies on the reversibility of protein coagulation, on the effects of irradiation of proteins, on the physicochemistry of lipids, her spectrographic studies on the cerebrospinal fluid, and her hematologic studies in Tay-Sachs and related disorders. In their joint work, the SPIEGELS were able to show that electric measurements of the polarizability of the cerebrum can be used as an index of permeability of semipermeable cell membranes, and that epileptogenic agents [33, 34] as well as cerebral concussion [26] increase the cellular
permeability in the cerebrum. In concussion, it was further demonstrated that nucleases appear in the cerebrospinal fluid [35], and electrographic studies revealed that subcortical areas are particularly affected [36].

The present writer was privileged to collaborate in some of these joint studies.

Historically it is interesting that SPIEGEL’S development of a method for quantitative study of the convulsive reactivity by electric stimulation of experimental animals with the skull intact [18], preceded the development of electroshock treatment of psychotic patients, an application that was suggested to him, but seemed to him inadvisable because of possible undesirable complications. This basic work served as an investigative tool for present-day anticonvulsant drug therapy in epilepsy.

In the winter of 1946, when prefrontal lobotomies were at the height of their popularity, SPIEGEL proposed to the writer that this operation be replaced by circumscribed lesions of the dorsomedial nucleus of the thalamus, the cell group that is the nodal point of the thalamo-frontal circuits. By limiting the lesions to this system and avoiding injury of cerebral association and commissural systems, it was hoped to avoid the personality changes appearing after the lobotomies.

This idea was the starting point of a new branch of neurosurgery, the stereotaxic surgery or stereoecephalotomy. Execution of this plan necessitated not only the construction of a human stereotaxic apparatus (stereoecephalotome) for introduction of guided electrodes, but also the development of a new type of cerebral topic anatomy determining the coordinates of subcortical structures in relation to intracerebral reference points.

In 1947 the first human stereoecephalotome could be described' [54] and the first thalamotomies [42, 53, 54] were reported; the first stereotaxic atlas of the human brain [49] and the results of variability studies were published within a few years. Further applications of stereoecephalotomy, treatment of so-called intractable pain by stereotaxic interruption of the spinothalamic system in the midbrain [47] and in the basal thalamus [57],

1 This first model is on permanent exhibit in the Smithsonian Institute, Washington, D.C., together with SPIEGEL’S collected papers.

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of extrapyramidal disorders by pallidoansotomy (Huntington’s chorea [44], Parkinsonism [46, 48, 50, 56, 63]), of certain types of convulsive disorders [51], of cystic tumors by injection of radioisotopes [62], soon became a reality. Besides its practical aspects, the possibility of introducing guided electrodes into the human brain with minimal cortical injury has also
greatly increased the scope of research by means of depth electrography
[43, 52, 61] and stimulation. As pointed out by RIECHERT [7] at the First
International Neurosurgical Congress, stereotaxic surgery, since its introduction
in 1947, has experienced an unexpected and strong development.
This has been evidenced by the construction of about three dozen modifications
of stereotaxic devices by various authors in this country and abroad,
by symposia (Montevideo 1955, Brussels 1957, Detroit 1957, Philadelphia
1961, Copenhagen and Vienna 1965, Madrid 1967), by the publication of
three more stereotaxic atlases of the human brain and by organization of an
International Society for Research in Stereoecephalotomy and related
national societies in USA, Japan and Italy.
The writer was indeed fortunate to have the opportunity to work in
Doctor SPIEGEL'S laboratory as a medical student. The association and
attachment to this great scientist increased over time, and it was eventually
possible, with him to apply experimental neurophysiological investigations
to clinical neurosurgical and neurophysiological problems in the human.
He has an uncanny gift for improvisation in the face of an obstacle or
difficult situation, and on numerous occasions this faculty has been of great
help, particularly during operative procedures.
Besides being a man of professional stature he is a kind, considerate and
gentle physician, doing to others what he would have them do for him and
not expecting from others what he himself could not do. His characteristically
untiring energy and effort, however, make it difficult for others to keep pace
with him.
Beside him always stands his gracious, loyal wife, a scientist in her own
right. Unfailingly she has been our consultant, and during our daily noon
discussions her opinions have been sought on a host of problems.
When the author had written the introduction to the `Festschrift' commemorating
his 65th birthday he stated that Dr. SPIEGEL could look back
on his career filled with notable achievements. However, Dr. SPIEGEL
looked forward to newer developments and scientific progress and not
backward to see what he had already achieved. He once told me in his quaint
way: `Who wants to repeat the old, that already has a beard?' And so it was
on to another life, another era of investigation. I often said to myself `God
grant him the courage and strength to last long enough', for his pursuit of
the unknown did not diminish in speed despite his advancing years.
His most recent studies have been directed toward the investigation of
akinesia and bradykinesia [37, 40, 41] and its relief in Parkinsonism. Together
with his wife he has prepared aqueous extracts of Fava and velvet beans,
natural and cheap sources of L-dopa for the treatment of Parkinsonism. The
writer is jointly working in this field.
In recognition of his work the University of Zürich, Switzerland, awarded
him an honorary degree, and he was elected honorary member of the
German Neurosurgical Society, corresponding member of the Vienna
Medical and Psychiatric-Neurological Societies. He received the coveted
Otfried Foerster Medal. The American EEG Society recognized his work
with an honorary fellowship and the Amer. Epilepsy Soc. with an honorary
membership.
The assembly of world renowned contributors to this volume was a
pleasurable task, and I am deeply grateful to those illustrious writers who
have justly honored this great man of science.

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