

Robert R. Holt. A review of some of Freud's biological assumptions and their influence on his theories. In N. S. Greenfield & W. C. Lewis (Eds.), Psychoanalysis and current biological thought. Madison: Univ. of Wisconsin Press, 1965.

What Holt does in this paper is to show the influence that Freud's acknowledged and unacknowledged biological assumptions (based on his training and work with such men as Ernst Brücke, Theodor Meynert, Josef Bräuer, and Sigmund Exner) had on the psychoanalytic theory he constructed after his gave up his attempt to explain behavior in terms of an anatomical-physiological model. Holt points to the advances that have been made since Freud's death in our understanding of the functioning of the nervous system. In light of this modern knowledge, many of Freud's concepts are seen as untenable. Strachey maintains that "much of what Freud has written in the 'Project' in terms of the nervous system now turned out to be valid and far more intelligible when translated into mental terms" (quoted on p. 109). Holt disagrees: "On the contrary, I believe that many--and perhaps most--of the obscurities, fallacies and internal contradictions of psychoanalytic theory are rather direct derivatives of its neurological inheritance" (p. 109).

This paper does not bear on psychoanalytic ego psychology per se, but rather on the question of whether Freud's structural, dynamic, and economic theories can survive in the light of modern understanding. Holt concludes that by making some basic modifications, psychoanalysis can get back to science: "...by making a relatively few basic modifications, psychoanalysis can take itself out of its dangerously encapsulated position and get back into the mainstream of scientific advance. I get an irrational glow of gratification at the poetic justice in the prospect that psychoanalysis may at last become the kind of productive science Freud wanted it to be by a return to the disciplines which he did his first scientific and professional work. Aside from sentiment, however, we owe it not only to Freud but to ourselves to protect the many and vitally important substantive contributions of psychoanalysis from the danger of wholesale rejection to which the general theory's vulnerability to methodological criticism exposes them" (p. 121). The question is whether Freud's theories survive as a psychological theory after they are changed to fit in with neurological understanding. Do they lose their psychological identity and become neurology? What happens then to the whole theoretical structure of psychoanalysis? It is true that one cannot maintain outmoded conceptions in blind faith in the face of ~~modern~~ modern day evidence to the contrary, but the question still is what becomes of Freud's theories if one follows the reasoning proposed by Holt? Does psychoanalysis then give up its position as a psychological theory and retain only its claim to being a treatment of psychological illness? Indeed, what happens to psychoanalytic technique as a result of the kinds of changes Holt is proposing in psychoanalytic theory?

I have a question as to whether Holt's paper has grown out of ^{the} emphasis over the past 25 years on ego psychology (i.e., the kind espoused by Hartmann, Kris, and Loewenstein, et al) or whether it is due to the influence of the systematizers (Gill, Rapaport, Holt, et al) who try, first of all, to construct a tight system out of psychoanalysis (Rapaport has written that Freud never did this, but that the system is inherent in his writings), and, secondly, who attempt to change some of theories basic to psychoanalysis in light of modern research in physiology (e.g., dreaming, sleep), neurology (e.g., pleasure-pain centers), and psychology (activity drives, exploratory drives, curiosity, manipulation). What does such an attempt at integration do to the classical theories of Freud? From an objective, rigidly scientific-methodology ~~oriented~~ oriented point of view, one must ask what of Freud should remain if modern research and techniques turn up evidence showing his theoretical suppositions to be in error? Holt refuses to accept Strachey's contention that Freud's neurological views are more intelligible when relegated solely to the realm of the mental. There is something ominous about this drift to neurological explanation and away from psychological theory. If man must be

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explained in a reductionistic manner solely in neurological concepts, then the science of behavior becomes the science of neurology. Other explanations are not allowed. (Pavlov made the assertion that psychology is really only physiology.) Is such a reductionism solely to neurological concepts necessary? Are psychological explanations always to be seen as lacking unless they can be shown to have their basis in neurology and/or physiology? Holt's point is that since current neurological understanding does not substantiate some of Freud's conceptions, we must then change ~~our~~ ~~regard~~ those conceptions so that they somehow "fit" ~~in~~ such neurological understanding; if they do not "fit," then they must be left by the wayside in our progress towards complete understanding of man. It is true that Freud said that ultimately ~~all~~ ~~the~~ ~~theories~~ physiology would explain all behavior, but I wonder whether he, too, as Holt does, ^{would} get "an irrational glow of gratification at the poetic justice" ~~or~~ what the systematizers are doing to his psychological ~~theories~~ ^{in light of current neurological knowledge}. I am reminded here of the joke about having too many friends, i.e., with all the friends of psychoanalytic theory who are doing their utmost to systematize it and bring it into line with current knowledge in neurology, physiology, etc., it needs no enemies.

 A review of Holt's paper:

"Many of the most puzzling and seemingly arbitrary turns of psychoanalytic theory, involving propositions that are false to the extent that they are testable at all, are either hidden biological assumptions or result directly from such assumptions, which Freud learned from his teachers in medical school. They became a basic part of his intellectual equipment, as unquestioned as the assumption of universal determinism, were probably not always recognized by him as biological, and thus were retained as necessary ingredients when he attempted to turn away from neurologizing to the construction of an abstract, psychological model" (94). ~~Address this conclusion~~ For support of this point of view, Holt presents first a summary of Amacher's findings (since printed in Psychological Issues-- that pertaining to Freud's neurological education and its influence on his theories), next, how the same set of biological propositions were retained in Freud's post-1900 theories with only some terminological changes, and, finally, "I shall indicate the paradoxes, inconsistencies, and other difficulties created by this set of assumptions and by Freud's ambivalence regarding the nature of the fundamental model with which he was working" (94).

Freud worked with or under Brücke, Meynert, Exner, and Breuer. "All four of these men were members of... 'the school of Helmholtz,' zealously preaching the doctrine of physicalistic physiology--an attempt to overthrow the preceding Naturphilosophie and vitalism by a rigorous attempt to treat the organism as a mechanical system. Freud's teachers, Amacher demonstrates, shared 'the idea that the nervous system functioned by transmitting a quantitatively variable phenomenon which was the mechanism of the nerve impulse from the afferent nerve endings to the efferent nerve endings'--i.e., at the sensory organs... Amacher makes the interesting observation that Brücke did not explicitly discuss the mind-body problem but everywhere wrote as if he assumed that all mental processes were simultaneously paralleled by physical ones. This tacit assumption '...allowed him...to describe a process partly in physical and partly in psychological terms.' 'This unrestrained shifting from descriptions in terms of mind to descriptions in physical terms is characteristic of the work of Freud's teachers and of Freud,' Amacher notes. As part of his rejection of the vitalism of his own teacher, Johannes Müller, Brücke introduced the idea that there was no spontaneous central activity of the brain, but explicitly declared that the functioning of the entire brain followed the model of the reflex arc: 'voluntary movements...too are originated by centripetal impulses; however, from them the conduction goes through parts of the cortex which serve consciousness, ideas, and will'...The result was an implicit conception of the whole nervous system as a passive instrument which remained in a state of rest

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until stimulated, when it functioned so as to rid itself of the incoming exogenous energies. One other statement of Brücke's..is worthy of note: 'The physical energies alone cause effects' (95).

"Meynert's conceptions of the nervous system were..similar to Brücke's. Actions, the ultimate effects of consciousness, 'are not the result of force innate in the brain. The brain does not, like a fixed star, radiate its own heat; it obtains all the force underlying all cerebral phenomena from outside'....Exner's book is of interest largely because it contains a synthesis of the same set of ideas and appeared in 1894, when Freud was beginning to flex his own theoretical muscles and just before he wrote the Project. Exner wrote: 'The excited condition of a nerve fiber appears to have no quality...(but) it is to the highest degree variable quantitatively'.....For convenience of exposition, I shall refer to the foregoing set of interrelated propositions about the nervous system and its functioning in relation to external inputs as 'the passive reflex model.'" (96).

In the Project "The commitment to physicalistic physiology is obvious in its opening lines and throughout: it is an ambitious attempt to be as scientific in the nineteenth-century Helmholtzian sense as possible, which meant to be rigorously materialistic and mechanistic: '...to represent psychical processes as quantitatively determined states of specifiable material particles....'...He then launches into an admirably clear formulation of 'the principle of neuronc inertia, which asserts that neurones tend to divest themselves of quantity'--his shorthand term for the neural impulse conceived of as purely quantitative à la Exner. Consequently, the nervous system as a whole strives to keep itself 'free from stimulus. This process of discharge is the primary function of neuronc systems.' This was the 'constancy principle,' which we have seen was the prevailing, anti-vitalist neurological dogma of Freud's time. How did quantity get into the nervous system, then, if the latter did not generate any of its own? From two sources, Freud said: from external reality via the sensory organs, and 'from the somatic element itself--endogenous stimuli, which call equally for discharge. These have their origin in the cells of the body and give rise to the major needs: hunger, respiration, and sexuality.' In these few words are contained both a theory of reality and a theory of motivation as tension-reduction....The consequence of such a conception of the nervous system as a passive conductor was that it could be disrupted or burnt out by the passage of too great a current of energy without a protective system of resistors. To take care of this problem, Freud adapted his teachers' views, which were not exactly that external energies entered the nervous system untransformed, but that the systems excitation was directly proportional to the amount of stimulation" (97-98).

"Turning back to the impingements of energy from within the organism, we should take notice of the fact that, although Freud's concept was essentially the same as that of his teachers, there is one major difference: they made no distinction as to relative odiousness between the stimuli arising from the two sources, but Freud noted one critical difference: 'The organism cannot withdraw itself from them [endogenous stimuli] as it does from external stimuli.' This fact upsets the principle of inertia 'from the very first,' for they cease only if 'certain definite conditions are realized in the external world.' Because of the 'exigencies of life,' to do so usually requires more energy than the endogenous quantities themselves provide, so the system 'must learn to tolerate a store of quantity sufficient to meet the demands for specific action'..... As I have pointed out elsewhere, Freud came up against an inability to furnish a satisfactory account of defense or of consciousness, because in both cases he got into a kind of regress in which he did not know when to stop. Something more like a person or a knower had to 'notice' the danger signal or the indication of quality, he felt, not recognizing that the model he had constructed was so well supplied with feedback loops (at least five may be distinguished) that it was as self-regulating as any cybernetic servo-mechanism of today. Though Freud was many decades ahead of his time he was too much its prisoner to see that the information return provided by a feedback loop could obviate any hypothetical.



nonconscious process of attention; ironically, he concluded that he had failed to provide a 'mechanical (automatic) explanation'..and committed his first great infidelity to the anti-vitalism of his teachers: he postulated an observing ego. True, they used the same term ('Ich'), and Meynert had a rather ~~an~~ elaborate and Freudian-sounding ego-theory; but they used Ich in the same way that Freud did at first in the Project, when it was merely 'the totality of cathected neurones.' In the end, however, he was forced to revive an essentially philosophical conception of the kind Johannes Müller would have felt at home with, in which the ego is a prime mover, the willer and ultimate knower, and thus a vitalistic homunculus with some degree of autonomy. This was one respect in which the Project failed. Despite Freud's great ingenuity and inventive resourcefulness, it also failed in a number of other ways: for example, concepts underwent such changes from one section to another as to be contradictory, as he molded them to the needs of the problem under discussion at the moment. It is worth noticing, however, that Freud simply went ahead and did the best he could, letting the contradictions stand and introducing nonphysicalistic concepts when he could see no other way out. Paradoxical as it may sound, this was to be one of his saving traits as a scientist, his way of enabling his theory to grow and new ideas to emerge before he was ready to fit them smoothly into the existing corpus....I am deliberately focusing attention on a limited range of propositions about the nature of external reality and about the passive, reflex nature of the nervous system, because these determine the characteristics of the theoretical model and shape a great many subsequent assumptions and propositions. Moreover, these are the parts of the theory that have become testable and have been overthrown" (99-100).

"Finally he turned his back on the attempt to work with an anatomical-physiological model and produced his first great work, 'The Interpretation of Dreams.'....In many respects Freud seems to have undergone a profound reorientation as he turned from being a neuroanatomical researcher to a clinical neurologist who experimented with psychotherapy, finally becoming the first psychoanalyst. We would be poor psychologists, however, if we imagined that there was not at least as much continuity as change in this development. Twenty years of passionate investment in the study of the nervous system were not easily tossed aside by Freud's decision to become a psychologist instead and to work with a purely, abstract, hypothetical model. Yet this is the usual assumption.....my contention (is) that Freud did not succeed in making a clean break with his past theoretical position...I shall have to content myself with the assertions ~~that~~ (a) that he never gave up the hope ~~of~~ to 'give up explaining things psychologically and start finding a firm basis in physiology!' as he wrote to Fliess in 1896, after his first disillusionment with the Project; (b) that he continued to use neurological terminology and propositions from the Project in Chapter VII even after explicitly disclaiming the attempt to do so, despite the fact that the new model has no place for these elements; (c) that he did not attain methodological clarity about the nature and status of the non-neurological theory he ostensibly was building, particularly *vis-à-vis* the mind-body problem; and (d) that, whenever the nature of his data demanded it, he lapsed into the silent assumption that the psychic apparatus was the brain, that the 'pathways' in it were nerve tracts, and that the energy ~~it~~ it used was physical in nature, located in and affecting the corporeal substance of the organs" (100-101).

"When a theory has as many difficulties as psychoanalysis does, a useful way of trying to understand and order it is to inquire into the nature of the model of man that it involves....Freud proposed two principle versions of the psychic apparatus: the topographic systems of Chapter VII, 'Interpetation of Dreams,' and the so-called structural or tripartite model of the ego, id, and superego." (102).
.....Freud adds his basic proposition about the affects of pleasure and displeasure, closely following the formulations of Exner. It is an appealingly simple and logical assumption: if the fundamental tendency of the human being is to seek pleasure and avoid displeasure (the pleasure principle), and if the basic property of its psychic apparatus is to rid itself of 'excitation' (note the lack of specification of just what is meant by that term), ~~is~~ why not equate them?" (103).



"In 1920 came the best known and perhaps most clearly formulated statement of the principle of constancy. In the first pages of 'Beyond the Pleasure Principle', he quotes Fechner: 'Every psychophysical motion rising above the threshold of consciousness is attended by pleasure in proportion as, beyond a certain limit, it approximates to complete stability, and is attended by unpleasure in proportion as...it deviates from complete stability.' Freud continued immediately after: 'The facts which have caused us to believe in the dominance of the pleasure principle in mental life also find expression in the hypothesis that the mental apparatus endeavors to keep the quantity of excitation present in it as low as possible or at least to keep it constant...the pleasure principle follows from the principle of constancy'" (104).

"In his published works, Freud was never as explicit as he was in the Project about the nature of reality. Whenever he discussed it, however, the emphasis is more often on dangers than on beneficent qualities or opportunities, though of course one of the principal contexts in which he treats of reality is as a source of need-satisfying objects.....The picture of an organism as a helpless creature 'threatened by the enormous energies at work in the external world' makes it amply explicit that Freud conceived of external reality as primarily a source of dangerous energies directly penetrating the organism, except for the screening effects of its protective shield. An obvious corollary of the passive, reflex model, the conception of motivation as the reduction of tension, is perhaps too familiar to require elaborate documentation. [He then quotes a passage from 'Instincts and Their Vicissitudes exemplifying this point.]" (104-105).
 "Thus, the assumption of endogenously arising instinctual needs ingeniously provides an explanation for the kind of behavior that the vitalists had called 'spontaneous,' and therefore Rapoport could write that the instinctual drives are the ultimate guarantees of the ego's autonomy from the environment. As Miller points out, however, behavior that is dominated by instinctual drives can hardly be considered autonomous, even with respect to the environment...Therefore, it remains exceedingly difficult to account for ego autonomy as long as the assumption of a basically passive psychic apparatus is retained. The final basic characteristic of psychoanalytic theory in its mature form shows an obvious continuity with and indebtedness to the doctrines of Freud's teachers is the heavy emphasis on forces and energies as explanatory concepts. Again, it is by no stretch of the imagination necessary to demonstrate by painstaking documentation that psychoanalysis is a dynamic psychology. Gill has convincingly argued that a principal fault of psychoanalytic theory has been an overemphasis upon a dynamic and economic considerations to the neglect of structural ones, a state of affairs he calls 'reductionism to motivation.'" (106).

"I have attempted to demonstrate so far that the prevailing conception of the nervous system during Freud's years as a student and budding scientist was that of a passive reflex apparatus; that Freud unhesitatingly adopted this as a necessary starting point in his own neuropsychological theorizing; and that the ostensibly nonphysiological models of his later years still incorporated these same assumptions" (106).

"It is certain that Freud hoped for an eventual integration of his theory with neurology [see "The Unconscious", Vol. 14, p. 175] and that he always considered the biological facts to be quite relevant to his decisions about his own model. I believe, therefore, that Freud would have considered it of great significance if he had known the following five biological facts (most of which, to be sure, have become familiar to us only since his death.) Taken together, they decisively refute and contraindicate the model of a passive reflex mechanism.
 1. The nervous system is perpetually active. Electroencephalographic data have shown that even in the deepest sleep and in coma the brain does not cease its activity; at these times of minimal input and behavioral output, hypersynchrony seems to produce the most massive discharges. The resting nerve cell periodically fires and its nontransmitted activity waxes and wanes, all without any outside stimulation.
 2. Thus, the effects of stimulation is primarily to modulate

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the activity of the nervous system. It may step up the frequency of discharge but mainly imposes an order and patterning on it; that is to say, encodes it. 3. The nervous system does not transmit energy; the nervous impulse is rather propagated. An appropriate physical analogy is not current running along a wired circuit, but the traveling flame of an ignited train of gunpowder. 4. The energies of the nervous system, whether or not triggered by the sensory organs, are different in kind from the impinging external stimuli. The sensory surface is thus not a conductor but a transducer. 5. The tiny energies of the nerves bear encoded information and are quantitatively negligible; their amount bears no relation to the motivational state of the person....." (p. 107-109).

"Brucke, Meynert, and Exner were wrong, therefore, as Fechner had been before them: the nervous system is not passive, does not take in and conduct out again ^{the} energies of the environment, and shows no tendency to 'divest itself of' its own impulses. The principle of constancy is quite without any biological basis. The notion of homeostasis, which is more a point of view than a working concept in physiology today, is only a vague analogy and cannot be used to bolster up this hoary anachronism. If we follow Rapaport in his attempt to order psychoanalytic theory and make it what Freud called a 'pure psychology,' it may be argued that these biological facts have no relevance to the fundamental assumptions of such a psychology. May one not, with Strachey, even maintain that 'much of what Freud had written in the "Project" in terms of the nervous system now turned out to be valid and far more intelligible when translated into mental terms'? On the contrary, I believe that many---perhaps most---of the obscurities, fallacies and internal contradictions of psychoanalytic theory are rather direct derivatives of its neurological inheritance. In the space remaining, I want to sketch out these dark areas of the theory, indicating what some of their principal difficulties are and their conflicts with the facts" (109).

Problems in the psychoanalytic theory of motivation and affect: "From the preceding sections it should be obvious how the nature of the model results in a tension-reduction conception of motivation and the pleasure principle. If it is the nature of the psychic apparatus to rid itself of tension, the behavior will be driven and organized by this necessity. The pleasure principle is the conceptual link between this viewpoint and the theory of pleasure and displeasure as falls and rises in the amount of this inherently noxious quantity. Similar theories of motivation as tension-reduction have been widespread in academic psychology. Yet there are a number of logical difficulties with this conception. The term tension is conveniently ambiguous, to begin with; at least three types of meanings for it can be distinguished. 1. Phenomenological-- tension is the subjective, conscious feeling of being tense.....Yet psychoanalysis is characteristically ~~is~~ preoccupied with precisely the sorts of motive that operate silently, without identifiable conscious feelings of tension....In general, then, conscious feelings of tension or displeasure do not operate in the required ways often enough to serve as a satisfactory definition. 2. Physiological--tension is an objectively measurable disequilibrium in the body. This in turn might be of three principal types: muscular tonus or strain, a state of biochemical imbalance in the blood.....or an 'alerted' or 'activated' state of the brain as indicated by the EEG or other electrical measurement. These three do not have any simple pattern of relations, and each subtype is actually so complex that it would be a hopeless and meaningless task to try to cast up a sum of all physiological tensions at any one time and then follow its fate. This biological meaning is hardly suitable, moreover, to be a motivational concept in pure psychology. 3. The final possibility is abstract--tension is a hypothetical disequilibrium of purely conceptual forces....For a concept like tension to have scientific value, it must be measurable (at least crudely) in some way that is independent of the behavior it is invoked to explain" (109-110).

"Over fifteen years ago, Murphy argued cogently for a group of activity drives and sensory drives...and collected a good deal of evidence in their support. Since



then, empirical evidence against the theory of tension-reduction has been mounting steadily... Experiments with rats have shown that the sweet taste of saccharine in water will be accepted as rewarding--hungry animals will work and learn for it, despite the fact that this substance cannot reduce any known physiological tension. Male rats will similarly exert themselves considerably to get access to a receptive female, even though the experimenter removes them after they have mounted and penetrated but before ejaculation, so that the sexual tension is never allowed to be discharged. In a notable series... Harlow.. has shown that monkeys will work for the stimulus-increasing reward of getting to look out of a box into the laboratory room, will work at mechanical puzzles for no reward other than the fun of doing them, and--as infants--have a strong need for the contact-stimulation provided by a mother-substitute. To revert to the human level, a number of investigators.. working with the concept of cortical activation as a result of volleys from the reticular formation, have shown that there is optimal, mid-range level of activation (which might be taken as a physiological definition of tension) for most kinds of behavior and that people tend to seek mild to moderate levels of stimulation which maintain cortical activation" (110-11). Also quotes the sensory deprivation experiments: ".none of them has reported that the Ss find the state of undistracted perceptual deprivation combined with rest and gratification of tissue needs very blissful" (111). Also the work of Olds and Miller on the effect of direct electrical stimulation of subcortical structures in the brain: ".have discovered septal areas which, when stimulated by appropriate pulse trains delivered by implanted electrodes, give rise to unmistakable aversive behavioral signs of intense unpleasure or distress.....it turns out that the quantity of stimulation..is unimportant, whereas the location of the stimulated site is vital....a shift of a few millimeters will put the electrode in a spot which, when given the same quantity of electrical stimulation, yields exactly opposite results" [refers here to the 'pleasure center']. (112). "We know from the data cited that motivation is not a matter of reducing either a physiological or a phenomenological tension and that pleasure is a valid and separate phenomenon in its own right, not merely the absence or reduction of pain or unpleasure. Thus, it seems clearly established that there are both positive and negative motivations, not merely negative. Observation surely suggests that there are adient, or approaching, as well as ~~spontaneous~~ or stimulus-reducing, motives, and we need no longer go through theoretical gymnastics to make it appear that what looks like approach and stimulus hunger is actually a way of fleeing from an even stronger, internal tensions" (112)

"In summary the extensions and applications of his passive reflex model to problems ~~Problems of the energy doctrine (the economic point of view)~~ of motivation and affect led Freud's theory into many conflicts with fact and to little of lasting value" (113).

Problems ~~with~~ of the energy doctrine (the economic point of view)--"The propositions I have been criticizing are largely energetic, despite the fact that ~~the~~ references to a reflex-arc model may sound structural. In line with the tradition of the school of Helmholtz, however, Freud consistently followed the assumption that scientific explanation had to rely primarily on forces and energies, and devoted a great part of his theorizing to dynamic and economic propositions.... ..Elsewhere I have outlined..most of the vagaries of Freud's usage of the concept of binding in relation to his energy constructs...I came upon over a dozen different ways in which Freud invoked the concept....Even if one wishes to work with the concept of psychic energy (which no longer seems to me completely defensible), it is difficult to see how even this hypothetical entity could exist outside of some structure to accumulate, transmit, and discharge it" (113).

"...Freud was unable to change [in regard to his ideas ~~on~~ energy] the habits of thought he had learned from his physicalistic mentors and seems not to have questioned the assumption that a dynamic or economic concept is always preferable to any other, even if it involves the successive postulation of a bewildering variety of types and modes of psychic energy (e.g., bound, fused, neutralized, aim-inhibited, etc.)" (114). "...it was natural for Freud to adopt as a first

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empirical propositions subject to verification or correction, but as unquestioned postulates, he put the whole theory further away from testability. In bringing these hidden, and now clearly erroneous, biological propositions out into the open and showing their mischievous ramifications in psychoanalytic theory, Amacher and I have tried to remain true to the spirit of Freud's reiterated hopes that his science would someday be brought back into contact with biology. He wrote, for example: 'we must recollect that all our provisional ideas in psychology will presumably some day be based on an organic substructure' [In his paper "On Narcissism", vol. 14, p. 78]. I believe that that day is fast approaching. An organic substructure can be provided today, incorporating nearly a century of research, which has greatly changed our understanding of the brain's structures--both gross and fine--and its functions since the doctrines of post-Müllerian physiology were laid down. The breathtaking rapidity of advance in neuropsychology today is in the most instructive contrast to the stately pace of change in psychoanalysis. Yet ~~but~~ by making a relatively few basic modifications, psychoanalysis can take itself out of its dangerously encapsulated position and get back into the mainstream of scientific advance. I get an irrational glow of gratification at the poetic justice in the prospect that psychoanalysis may at last become the kind of productive science Freud wanted it to be by a return to the disciplines in which he did his first scientific and professional work. Aside from sentiment, however, we owe it not only to Freud but to ourselves to protect the many and vitally important substantive contributions of psychoanalysis from the danger of wholesale rejection to which the general theory's vulnerability to methodological criticism exposes them" (120-121).

