

EXPERIENCES WITH PRIMARY PROCESS THINKING*

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Freud, in *The Interpretation of Dreams*, was led to postulate the existence of two psychic systems which he designated as primary and secondary.¹ He held that the interactions of these two systems were responsible for the range of psychic activities, from latent dream thoughts and dream work to the manifest content and to waking, conscious psychic activities. He held that the primary system had the function of attempting and, when possible, of achieving immediate gratification of wishes and therefore of the needs out of which the wishes arose. The function of the secondary system was less well defined; but essentially it consisted in modifying, temporizing, or even holding in abeyance and finally denying the gratification aimed at by the primary system. It is to the function of the secondary system that Freud attributed the phenomenon of repression.

As will be recognized, the primary system is what later became largely subsumed under the "id" (by way of the "pleasure-ego"); the secondary system later became designated both "ego" and "super-ego."² The functions of the id do not reach consciousness directly but only as modified through what was originally designated as the censor and later as the ego. In dreams, and particularly in situations wherein the functions of the ego are maximally suspended but not yet suspended so greatly as to entail complete unawareness and reportability of the psychic activities, the id functions come most clearly into view. This occurs, therefore, in the relatively unobstructed carrying out of instinctual, that is consummatory, acts.^{3, 4, 5} Thought of a logical, discursive nature occurs when the secondary processes hold chief sway and the primary processes are held under repression or delay.⁶

Since the discovery of the hallucinogenic properties of LSD there has been a great rise of interest in the phenomena of hallucinations. Central to this interest, is the thought that an understanding of the mechanism of LSD reactions leads to an understanding, and a possible hope for control, of the psychoses designated as schizophrenic. The present reported work, based in part on personal experience, is concerned with just this conception.

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EXPERIMENTATION

In 1848 the English explorer, Robert Spruce,⁷ described the use by South American Indians of an intoxicating liquid, *caapi*, prepared by steeping lengths of vine in hot water. This vine he named "*Banisteria caapi*." Later explorers found this drink to be prepared under a number of different names, among which are *yage*, *yaje* and *ayahuasca*. Eighty years later Lewin wrote:⁸

The preparation of the drink *yage*, or *caapi*, varies from place to place. A preparation made by steeping the roots or leaves in cold water is evidently quite weak. Preparations made with boiling water, which are evidently concentrated during the boiling, are, of course, much stronger. The reasons for drinking *caapi* are quite unspecific other than that the witch doctors who have the gift of prophecy under the influence of the drink can discover the plans of enemies, diagnose and heal illnesses, etc. Others take this drink in order to comfort themselves or to increase their prowess in war or in the hunt or to improve their luck in hunting rubber. Also, drinking at home occurs when the individual has an irresistible urge to place himself in a trance state in which he experiences pleasant and unusual things and in which he wishes to foretell the future. In the upper Caqueta, apparently, slaves and masters will engage in orgies together, most of the drinkers being men. Young men are introduced to the drink on festive occasions. Spruce took part in such a festival at night and experienced the effects after drinking a calabash full. (Few drank more.) Generally the drink brought about vomiting, but nevertheless enough was absorbed to bring about the effect on the nervous system. After some two minutes an Indian became dead white, shook in all extremities, broke out into a sweat and exhibited restless madness (Wut). The intoxicated one grasped his weapons, shot toward the door, struck mightily on the door posts and the floor while he cried: "This would I do to my enemy were this he." After this, with shrieking and dancing and possibly also with convulsively initiated excitation which lasted some ten minutes, there followed quiet exhaustion and dream-filled narcosis. The experimenters who have taken a similar amount (estimated at somewhere about a liter) agree with this with only slight variations. There occur, during the introductory phase, transformations of the sense of warm and cold and visions like changing pictures pass transiently before the eyes. Magnificent and frightful do they appear. Many-formed phantoms come and go. Beautiful scenes, villages, towers, parks, forests with fruit-laden trees, birds with glistening feathers or wild animals appear before the inner eye. All sensory spheres are excited. Later it was reported by the Indians (Carigonas of the Caque region, Colombia) that there is supposed to be such visual acuity that it permits movements to be perceived and objects to be discovered of which nothing is otherwise known. After the loss of consciousness, the unconscious person is supposed to be

receptive to telepathic communications. In 1912 Bayon used caapi successfully against beri-beri and the subject in this condition let him know that his father, a great distance away, had died and that his sister was sick.

When Lewin described the use of caapi, it became evident that the major alkaloid of *B. caapi* and its related species was harmine.^{9, 10} In 1957, examination by modern techniques disclosed the presence also of lesser amounts of tetrahydroharmine and of harmaline¹¹—alkaloids which are also found in the seeds of *Peganum harmala*.¹² Seeds of this plant have been used from time immemorial as an anthelmintic, an emmenagogue and a mild, alcohol-like intoxicant.¹³ However, aside from the use of Banisteriopsis, there has been little evidence that these alkaloids are capable of producing hallucinations,¹⁴ and, indeed, the source of the hallucinogenic action remains still *sub judice*.

In October 1957, the writer received by air mail from Dr. Jesus Idrobo, ethnobotanist of the Instituto de Ciencias Naturales in Bogota, a quart of frozen yaje. Of it, Dr. Idrobo wrote: "The yaje I have for you is most probably from *Banisteriopsis caapi* and if my Indian friend is not telling lies, it has no additional herbs. It is rather strong, as they take a demi-tasse three or four times during the whole night and yet they keep drunk all that time. It is also a very strong and fast laxative and for that reason most of the country people around Mocoa drink it once in a while."

The yaje from Colombia, when allowed to thaw, separated into a brown liquid and a copious brown precipitate. After being well shaken, an aliquot was found to contain 257 mg. of solid matter per ml., of which 7 mg. was soluble in chloroform; 100 ml. of this preparation yielded 915 mg. of crude alkaloids as hydrochlorides. In view of Dr. Idrobo's letter and in accordance with observations described by Dr. Richard Evans Schultes,¹⁵ the writer felt that 2 oz. of the preparation should produce a moderate degree of intoxication. Accordingly, on October 24, 1957, 60 ml. of the yaje was heated in a double boiler for 15 minutes to preclude a later illness unrelated to yaje intoxication.

After cooling and diluting up to 200 ml., I took aliquots equivalent to 15 ml. at 7:30 p.m., 15 ml. at 8:00 p.m., 15 ml. at 8:30 p.m. and the last at 9 o'clock. During this time and until 11:00 p.m., I played bridge with my wife and friends, now and then leaving to make comments on a tape recorder. At about 10:30 I began to feel nauseated and to have a sort of bodily numbness. The

nausea finally called a halt to social activity, and our friends departed with some misgivings.

As our guests were seen to the door by my wife, I sat by the tape recorder with my eyes closed. Suddenly there appeared before me a mountainous plate of ice cream, the melting waves of which were all tinged with blue. Surmounting this amazing cone was an enormous brilliant red cherry. I was struck with wonder at the color and clarity of the image which persisted and then recurred. To this day when I think of it I can re-evoke the image with almost the intensity of the first instant of its perception. Later, other images were to appear—one a scene which might have come from a Dickens novel. I saw the back door of a house in a crowded London slum district, from which emerged a dandy—a fop—with elegant airs and mannerisms. The thought came to me that he should look foolish, and instantly he was replaced in my mind's eye with a half-witted lout with thick, coarse yellow hair resembling a mop; and as he came from the stoop and turned around, he was kicked in the rear by an American Indian dressed in a loin cloth, himself a comical character. The whole apparition conveyed the most droll and slapstick impression. Later, a Revolutionary War soldier in full regalia was seen with an amber light coming from above and behind, yet in such a way as to cause the brass buttons on his coat to emit a golden luster of great beauty.

Regarding my associations to these images, I would like to quote Sir Francis Galton, who wrote, apropos of his word-association tests: "They lay bare the foundations of a man's thoughts with a curious distinctness, and exhibit his mental anatomy with more vividness and truth than he would probably care to publish to the world."

Vomiting, which continued throughout the night, finally eased off toward 7:00 a.m., leaving me completely satisfied that I had taken *my* maximally tolerated dose of yaje.

In December 1957, I felt it would be desirable to round off this experiment by taking the alkaloids; accordingly, I took 915 mg. of hydrochlorides from 100 ml. of yaje in divided doses during a two-hour period. I had no nausea, no feeling of bodily numbness and only the vivid visual imagery with closed eyes. The imagery, which began about one hour later, was less intense and less colorful than with the yaje, but persisted for several hours.

Still later I found that 250 mg. of harmine and as much as 20 mg. of dl tetrahydroharmine had no intoxicating effect.

Now began a period of thoughtful evaluation. I wondered whether I had merely become conscious of images always present. Were these yaje-induced visions significantly different from hypnopompic hallucinations? Were they, in another way of thinking, self-induced, autohypnotic phenomena with a large element of self-deception? If this were so, it would also accord with the majority of reports since Spruce on other uses of yaje.

But why, if this be so, should this particular substance be chosen when autohypnosis requires no special adjunct? How is it that the 25 to 75 mg. of telepathine of Lewin was more effective than the 915 mg. of crude alkaloid which I took? These and many other questions must be set aside at this time for lack of adequate information.

Shortly after my trial of yaje alkaloids, I realized that I frequently have similar images when I close my eyes to sleep. These images are usually very ephemeral and more often formless color or shade than identifiable objects. Rarely have I observed images as well defined and persistent as those I perceived under yaje. Usually motionless, some have had a cinematic character, though completely silent.

Long familiar as I was with the half-dreamlike quality of hypnopompic hallucinations, I thought I could discern a difference between the "images" and the half-dreams; this lay in my feeling toward the former that I was a mere spectator, as at a gallery or movie. With the hypnagogic material there is more of a sense of involvement—not as a person outside the scene, but as one in it.

It was while I was going through some of the literature on the subject and my mind was filled with many related problems, that I was taken ill with influenza and had a few days to spend in bed. The work of McKellar¹⁶ had recalled to me the frequency with which visual impressions would flow across my inward eye at times when I had given myself over to reverie. Therefore, I set myself to observe, during the day, but with eyes closed, the images which occurred to me and to explore their relationship to my contemporary ideas and emotional state. My temperature was normal. The surroundings were quiet. After some experimenting, I realized the best way to work was to let my thoughts wander rather

than to try to focus on image production or detail; these came well enough effortlessly.

I was at once amazed by the wealth of images which came before me as soon as I had composed myself to become aware of them. Always, as I began to think of the possible psychogenesis of an image or an item thereof, the image would shift and change or suddenly be replaced by another bearing no recognizable relationship in form to the preceding.

As I reflected on the fate of a Chinese classmate of mine, my thoughts turned to the prediction that China soon may have a population of a billion persons. What would happen? The pressures for expansion would be tremendous and from the Malay States there would be no resistance. India, with its own population at the same level, would be formidable but for its ages-long mystical retreat in the submission of widespread personal psychic defeat. With some outside aid it might keep China at bay. If Russia realizes the danger in time she will limit aid to China's industry, agriculture and armament. In that case, with determined... At this instant I saw a huge silvery-gray blanket or tarpaulin covering a lumpy, irregular area. From a spot near me there jutted out two like processes, each with a long, thin pedicle ending in an irregular five-pointed star. These were moving up and down vigorously at first, then more feebly until at the last they hung limp and inert—"Die on the vine" were the words which flashed to mind as the image faded.

I had begun to consider how to improve a certain lecture. The last time I gave this, it had been a miserable fiasco and I felt humiliated by my failure to put across the anatomy and physiology of emotions on the basis of presently-available information. My reflections led me to consider various ways of presenting the material and perhaps of taking more time to do it. I could, for example, open with a different view of a dissection of the rhinencephalon. . . . At this instant I visualized a huge, dimly-illuminated area in what I took to be a cathedral. Above me were three beautiful objects. Alike in general design, but differing in decorative detail, these were shells of translucent white porcelain, shaped like the half of an egg shell cut end-to-end. Each was marked with jet-black spots of varying shapes and sizes. Each shell had one bold sweep of black uniting it with its fellow. The whole was breathtaking in its effect, but I could not conceive what connection it had

with my thoughts at the moment of its evocation. Associations were followed along various lines, each seeming more unrelated than the last. Suddenly an image appeared of three men in a doorway, holding horizontally a girl suggestive of Martha Raye and yet also of Ethel Merman, making facial grimaces and ineffectual struggling movements. "Foolish and gay," I thought. The image vanished and I returned to my original reflections. . . . I thought to require students to prepare for the lecture by having diagram outlines of certain cross-sections of brain before the lecture. With this I could . . . again the image of the porcelain shells appeared and at the same instant I could see that they symbolized my wishes: To have a perfectly beautiful and vivid and well-organized presentation. In this each point would stand out clearly in refined detail. Each major segment I would unite with other major segments by a bold, confident, easily-followed stroke. My hearers would be held breathless; amazed at the presentation as well as enlightened thereby. . . . The image faded.

My thoughts had turned to certain administrative activities for which I am responsible. My obsessive-compulsive character, marked by a degree of indecisiveness, has led at times to decisions which I would rather not have made. I thought of one recent failure to make my own decision, of the arguments of others to which I had bent against my better judgment. . . . I saw the back of a man's neck. It was a short neck, very broad, very hairy. It fascinated me to read into it implications of the personality of him who had such a neck; strength of will, bull-necked, bull-headed; at this point the image enlarged and the short neck was topped by a well-rounded head covered with a cap such as field commanders nowadays prefer. The amount of hair growth indicated that he had not recently been shaven or shorn, but there was no wild growth—discipline was as much a part of this picture as was strength and these were both balanced by excellent executive judgment. Such a man could order with full self-confidence. The image remained longer than others were wont to do and recurred again as I thought of other times I have remained indecisive.

Not every image I saw, could I trace to the immediate thought and affect of the moment. This I attribute in part to the need to make selection, so that many images received scant effort at resolution. More important, however, I recognized in others the resistances which I often encounter in analysis and of these I

think the one of special interest to be dissociation. As exemplified in the image of the porcelain shells, I actually worded the associations so that an outsider would have come to immediate understanding; it was only I who could not make the proper connection.

Several months after the experiences described here, I took LSD, 50 μ g., in the company of my wife and a psychoanalyst friend. Personal reports of LSD experiences are now so numerous that of my own experiences I need only say that the feeling of intoxication began at 35 minutes with a sensation of numbness. Then I began to speak rather too freely about some personal matters of which I perceived some projection later. At 60 minutes there was a beginning of an intensification of colored after-images. Diarrhea occurred at one hour 15 minutes, and almost at the same time I experienced vivid visual hallucinations in color, though only with my eyes closed. With my eyes open there was micropsia with the sensation of objects being closer than they actually were. This phenomenon persisted in waves for an hour and a half. The usual kinesthetic alterations occurred, as did some alterations of body image, related usually to distortion of a visual nature. At this time there were also difficulties in speech—a tendency to slur which was overcome by exaggerated exactness.

At the second hour, particular attention was paid to the visual images which occurred with eyes closed. Concerning most of these, there was such a personal element that I do not wish to describe them here. However, it can be said that as I later reviewed the experiences I could discern the laying bare of my inner life in the images which came to mind. Of one of these I may comment that most were marked by an extreme delicacy and by the duplication of extremely minutely-defined lines and points. For the last few years, my vision has been failing and I have had reason to fear the loss of vision in one eye; advanced presbyopia in the other seriously interferes with my reading. The images would reassure me of my visual acuity and were accompanied by a most pleasant emotional tone.

I was particularly concerned in this experience, however, to determine whether there was primarily a distortion of affect and a decrease of conceptual capacity which, combined with a difficulty of perception, might offer some clue as to whether the LSD experience is, as many like to believe, a prototype of a schizophrenic experience. At the height of the intoxication I was able to make

some observations about the nature of the reaction to which I think I can fully subscribe at the time of writing. With a dosage of intoxicant which was quite enough to produce marked perceptual distortions and to produce one manifestation of the primary processes, there was no evidence of a diminution of conceptual capacity, nor of a primary negative affect. In comparison with the experience under yaje and with spontaneous imagery, the images under LSD were much more plastic, fluid, sometimes occupying, as it were, all four quadrants of the field of vision with four simultaneously shifting images. It was possible to bring back some of the images after they had once been lost, but never did they persist in the way the yaje or spontaneous images have done. The LSD experiences for me seemed, in retrospect, to have involved a great deal more narcissistic self-containment than did the yaje or reverie. There was a marked withdrawal and a pleasurable preoccupation with my own images. There was a sense of displeasure on being drawn again by my feeling of scientific obligation to examine the implications of these images and to return to the world of reality.

DISCUSSION

"What," it might be asked, "have these experiences with yaje, LSD and reverie to do with schizophrenia? In the first instance, the doses of yaje and of LSD were minimal. By your own data you reveal that they did little more than enhance or accentuate a phenomenon which you experienced by reverie alone. In the second instance, this is merely another anecdotal account, somewhat decked out with personal interpretations, which must be suspect. For instance, the fine filigree work in your LSD images is common to many intoxications and, as Klüver^{17, 18} asserted, is not specifically related to your visual difficulties. Anyway, there is a plethora of this sort of datum, much of it better than yours and still unpublished."

To this I must agree. But it must also be agreed that I have first person singular experiences with the states called models for schizophrenia, which now exercise so much of the scientific community and hold the hopes of so many people. Further, I would urge the point that it is not in the extremes of psychotic defenses and counterdefenses that one must look for understanding of the origins and nature of schizophrenias, but rather in the very mild-

est beginnings and least disturbances. It is not at the end station, but to the first departures that we must look.

In this way the states I have known and described are found at once to be those described by other authors as oneiric.¹⁰ These states are marked by the eruption into consciousness of primary process activity: Concepts are experienced as percepts; the percepts are largely in the visual sphere, although other senses may be excited as by a synesthesia or entrainment; doubling of consciousness occurs in the milder degrees so that secondary processes continue to exercise criticism and evaluation of the primary. In these instances the affective state follows the conceptual and perceptual states. Lately we have learned that they are concomitant with low voltage fast activity in the EEG.^{20, 21} The more extreme of these states have been described, for example, by Meduna: "The basic symptom in the oneirophrenic condition is a disturbance of apperception." The sense modalities mostly afflicted, in order of frequency are: vision; various proprioceptions and interoceptions, including body image; smell; hearing; foggy or hazy vision (difficulty in central vision)--things look different. The patients usually fight the feeling of unreality. They succeed in rejecting the pathological experience for a surprisingly long period. As far as secondary symptoms go, patients react according to previous personality. The first reaction is fear and confusion. The type of hallucination in oneirophrenia is "exogenous," as occurs in delirium, mescaline and other states, not in the "endogenous hallucinations" of schizophrenia.

The onset of the oneiric states differs in essentials from that of the schizophrenias. The latter is known from many reports in the literature,^{22, 23, 24} as well as from the many patients who have described to the author among others how their psychoses began. Most regular and significant is a preliminary phase of increasing frustration. The frustration arises out of the double-bind situation of which Bateson, Jackson and Haley²⁵ have given a few examples. The variety of ways in which this develops is unmeasured, but they have in common the fact that the organism is put under a stress which cannot be solved by rational means. There remain three possibilities: murder, suicide, psychosis.²⁶ As one man told me, "If I killed myself or my mother there would be no hope. I didn't know it, but it's as if I could keep hope alive by becoming a living dead."

At the end of the period of double-bind frustration, under the pressure of intense affect, a psychic "flip-flop" occurs. To the patient and to the outer world, this may take place very quietly; but, however quietly, the other world of the schizophrenic is entered. This is not the world of reverie, of the oneiric state. At times, it is true, the transition is marked by drama; by days and nights of self-torture, of battle with some inner or outer object, of sleeplessness, suddenly ending with a full-blown mixture of the oneiric and the schizophrenic states.

It is the thesis of this paper that there are two kinds of psychologic reactions which may be often intermingled, but which arise from different causes and have different clinical manifestations, and probably have both different courses and treatment. The one in the extreme becomes schizophrenia, the other oneirophrenia. The former has been experimentally produced, to the writer's knowledge, in only one way: by producing an insoluble conflict over a protracted time under conditions of strong motivation and danger.^{27, 28}

The latter, the oneiric state, has been produced in a variety of ways which have in common the reduction of sensory and alerting input to the higher levels of the central nervous system: reverie, sleep, sensory deprivation, sleep deprivation, prolonged isolation,^{29, 30} or by inhibition of trans-synaptic activity in cortico-cortical transmission through drugs.^{31, 32}

Each way brings to the fore certain aspects of the function of the primary processes, under the dissolution of control by the secondary system. There is an extensive body of data correlating these two modes of dissolution with the anatomy, chemistry and physiology of the central nervous system. It is beyond the scope of this paper to describe this work and to show relevance to the thesis presented. However, it is tentatively suggested that the oneiric state is concomitant with decrease in alerting activity from tegmental and thalamic reticular activating systems, with the release of Pribram's posterior system³³ from peripheral control. The schizophrenic state is thought to be concomitant with "permanent" bias of the tegmental nuclei (reticular activating system and *n. interpeduncularis*) under the influence of an excess of discharge from the fornix and medial hypothalamus over the medial forebrain bundle and lateral hypothalamus; the effect is thought to release Pribram's anterior system from conceptual control.

SUMMARY

Personal experiences with primary process thinking are described under conditions of intoxication with the South American hallucinogenic decoction *yaje*, under LSD, and under reverie. The essential psychological equivalence of these conditions is contrasted with that of the schizophrenic. The former are considered to be examples of the oneiric state, also seen in conditions of sensory deprivation and prolonged sleeplessness. Suggestions regarding a neurophysiological basis of the oneiric state and the schizophrenic state are offered.

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REFERENCES

1. Freud, S.: The Interpretation of Dreams. J. Strachey, translator. P. 599 ff. Basic Books. New York. 1955.
2. Freud, S.: The Ego and the Id. Sixth printing. Hogarth. London. 1950.
3. Tinbergen, N.: The Study of Instinct. Clarendon Press. Oxford. 1951.
4. Fletcher, R.: Instinct in Man. International Universities Press. New York. 1957.
5. Tanher, E. S., and Green, M. R.: Pre-logical Experience. Basic Books. New York. 1959.
6. Cassirer, E.: Language and Myth. Dover. New York. 1946.
7. Schultes, R. E.: Richard Spruce Still Lives. The Northern Gardener, 4: 39-42, 1950.
8. Lewin, L.: Untersuchungen über Banisteria caapi. Suppl. Arch. exper. Path.u.Pharm. 129: 133, 1928.
9. —: Sur une substance enivrante, la banisterine, extraite de *Banisteria caapi*. Compt. rend., 186: 469, 1928.
10. Mors, W. B., and Zaltaman, P.: Sobre o Alcaloide da Banisteria caapi Spruce o do Cabi paraensis Ducke. Bol. Instituto quimica agricola (Rio de Janeiro), 34: 17-27, 1954.
11. Hockstein, F. A., and Paradies, A. M.: Alkaloids of *Banisteria caapi* and *Prestonia amazonicum*. J.A.C.S., 79: 5735-5736, 1957.
12. Henry, T. H.: Plant Alkaloids. Fourth edition. Blakiston. Philadelphia. 1949.
13. Gunn, J. A.: The harmine group of alkaloids. In: Handbuch der experimentellen pharmakologie. A. Hoffer, editor. Ergänzungswerk, 5. Band: 184-196. Springer. Berlin. 1937.
14. Pennes, H. H., and Hoch, P.: Psychotomimetics: clinical and theoretical considerations: harmine, WIN-2296 and nalline. Am. J. Psychiat., 113: 337-392, April 1957.
15. Schultes, R. E.: Personal communication.
16. McKellar, P.: Imagination and Thinking. Basic Books. New York. 1957.
17. Klüver, H.: Mechanisms of hallucinations. In: Studies in Personality, in Honor of Lewis M. Terman. R. Bernreuter et al., editors. McGraw-Hill. New York. 1942.

18. —: Mescal: The Divine Plant and its Psychological Effects. Kegan Paul. London, 1928.
19. Meduna, L. J.: Oneirophrenia. The Confusional State. University of Illinois Press. Urbana, Ill. 1950.
20. Bente, D.; Itil, T., and Schmid, E. E.: Elektrencephalographische Studien zur Wirkungsweise des LSD-25. Zentralbl. ges. Neurol., 140: 25, 1957.
21. Merlis, S., and Hunter, W.: Studies in mescaline. II. PSYCHIAT. QUART., 29: 430-432, July 1955.
- 22a. Sechahaye, M. A.: Symbolic Realization. International Universities Press. New York. 1951.
- 22b. —: Autobiography of a Schizophrenic Girl. Grace Rubin-Rabson, translator. Grune & Stratton. New York. 1957.
23. Jackson, D. D., and Weakland, J. H.: Schizophrenic symptoms and family interaction. A.M.A. Arch. Gen. Psychiat., 1: 618-621, December 1959.
24. Kraepelin, E.: Psychiatrie. Vol. 3. Barth. Leipzig. 1913.
25. Bateson, G.; Jackson, D. D.; Haley, J., and Weakland, J.: Toward a theory of schizophrenia. Behavioral Science, 1: 251-264, October 1956.
26. Menninger, K. A.: Psychological aspects of the organism under stress, Part I. J. Am. Psychanal. Assn., 2: 67-106, January 1954.
27. Bartlett, F. C.: Ferrier Lecture. Fatigue following highly skilled work. Proc. Roy. Soc. London, sec. B, 131: 247-257, May 1943.
28. Beamish, P., and Kiloh, L. G.: Psychoses due to amphetamine consumption. J. Ment. Sci., 106: 337-343, January 1960.
29. Lilly, J. C.: Mental effects of reduction of ordinary levels of physical stimuli on intact, healthy persons. Psychiat. Res. Reports, A.P.A., No. 5, June 1956, pp. 1-28.
- 30a. West, L. J.; Janszen, H. H.; Lester, B. K., and Cornelison, F. S.: The psychosis of sleep deprivation. Ann. N. Y. Acad. Sci., 96: 66-70, January 13, 1962.
- 30b. Morris, G. O., and Singer, M. T.: Sleep deprivation. Transactional and subjective observations. A.M.A. Arch. Gen. Psychiat., 3: 453-461, November 1961.
31. Marazzi, A. S., and Hart, E. R.: The relation of hallucinogens to adrenergic cerebral neurohumors. Science, 121: 365-367, 1955.
32. Evarts, E. V.; Landau, W.; Freygang, W., and Marshall, W. H.: Some effects of LSD-25 and bufotenine on electrical activity in the cat's visual system. Am. J. Physiol., 182: 594-598, September 1955.
33. Pribram, K. H.: On the neurology of thinking. Behavioral Science, 4: 265-287, October 1959.