

Unexpected Schizophrenic-like Syndromes in Africa

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This paper is an extremely condensed abstract of field notes collected during eight years of work in Angola and Mozambique from 1937 to 1945. During this period of passionate research the author became acquainted with the various cultures, languages, and dialects of natives of the Mayombe Forest (north of Angola, bordering the Belgian Congo), Southern Rhodesia, South Africa, and Mozambique.

The first three years were focused mainly on ethology, and a book was published with a grant from the Institute for the Advancement of Science in 1945.² This book was considered a landmark in its field by Professor Adolph Schultz, Department of Primatology (Physical Anthropology) of the Johns Hopkins Medical School, Baltimore, Maryland.³ The material obtained in the remaining five years of field work constituted the bulk of a Ph.D. thesis (Columbia University, 1954).

In this paper I shall describe three different classes of clinical schizophrenic experience encountered during five years of almost continuous field work in Mozambique. First is the finding of schizophrenic-like reactions accompanied by swelling of joints, bronchial asthma, and neurodermatitis in 70 percent of a sample of 100 natives after their exposure to "catastrophic" anxiety or frightening emotional stimuli associated with witchcraft activities. Second, the finding of schizophrenic-like reactions (also accompanied by arthralgias, bronchial asthma, and skin reactions) in 80 patients out of a group of 100 subjects who were given entirely alien foods during a period of local famine. Third is the observation of schizophrenic-like syndrome in 50 natives who had eaten the tissues or organs of an African frog.

In general the psychotic reactions observed were characterized by errors of perception which could not be inferred as the outcome of sensory defect, afferent abnormality (color blindness or phantom limb), neurological defect, affect dysfunction in its pure nosologic sense, or other organic determinants. Nor was it connected with the action of drugs, alcohol, or other native intoxicants, trauma, convulsive disorder, cardiovascular disease, senile condition, metabolic or growth disturbances, sleep

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³ Letter by Professor Adolph Schultz dated March 21, 1947.

deprivation, battle fatigue, sensory deprivation, hypnagogic conditions, or errors of evaluation.

The psychotic episodes had a common denominator: they were all transient. Most of the patients developed three subcategories of schizophrenic syndrome: catatonic, paranoid, and hebephrenic.

CLINICAL PICTURE

Reactions of Behavior as a Response to Magical Fright

Seventy-five women showed the following symptoms: paranoid delusions, auditory hallucination, mutism, flexibilitas cerea, cogwheel rigidity of the limbs, hypoglycemia, pulse 170 per minute, fasting blood pressure 106/60, edema identifiable on the shoulders, elbows, wrists, knee joints, and signs of labored respiration. Further examination indicated bilateral lung rales and signs of bronchial asthma. Twenty-five men showed even more striking behavior: paranoid delusions, extreme tension, assaultive behavior, auditory hallucinations, incoherent and irrelevant speech, echolalia, neologisms, talking back to the spirits which they believed to have possessed them. They also had skin rash involving both dorsal aspects of arms, legs, back, shoulders, face, and abdomen with intense pruritus. The pruritus was interpreted by the natives as the proof that the spirits were trying to leave their bodies. Besides, six had arthralgias and asthma; some were incontinent for urine and feces. Most of them showed severe disorientation as to time, place, and person.

Schizophrenic Reactions After Eating Food Alien to the Cultural Nutritional Pattern

Several times there were periods of famine in the villages supplying workers for the European plantations. In these circumstances European food had to be brought in to prevent fatal starvation. Subsequently I began investigating whether or not some kinds of food alien to the natives' diet might

cause any sort of mental disorders.

A sample of 100 normal, healthy natives were given to eat alien food items during a one-month period. By the beginning of the second month, 80 out of the 100 developed schizophrenic-like behavior of the catatonic and paranoid type. It was noticed that this behavior began after ingestion of smoked fish. After discontinuing this food all patients returned to their previous normal behavior. When, however, that fish was again given to them, they once again developed schizophrenic-like symptoms together with skin reactions, arthralgias, nausea, and vomiting. Their heart beat was fast—pulse 170, blood pressure 60/100; their blood was hypoglycemic. They suffered intense lacrimation, frequent enuresis, and diarrhea. Samples of urine and stool were found free of bacteria or parasites. One week after discontinuation of the fish the natives were again asymptomatic.

In all these results and those of other investigators it is tempting to speculate to what degree, if at all, the research of Solomon Snyder of Johns Hopkins, Baltimore, is pertinent to our studies. Snyder has posited on firm experimental evidence that the main cause of schizophrenia (if not in all, then at least in most cases) is related to a brain enzymatic dysfunction leading to the persistence of an excess level of dopamine, which in turn leads to a schizophrenic reaction.

Schizophrenic-like Syndrome in 50 Natives After Eating Tissues or Organs of an African Frog

Of all my African investigations, none was more fascinating and mysterious than the reason why 50 Bantu Negroes (all males between the ages of 18 and 50) unpredictably went acutely psychotic and showed forms of behavior both during the length of the illness and, *mirabile dictu*, subsequently their complete recovery—behavior entailing all the earmarks of enlightenment—through the lasting change of magical thinking to

Aristotelian patterns of thought.

Initially their schizophrenic-like episodes offered the field worker the impression of being similar to simple reactions to magical fright. However, months of research led me to causally link them as due to having been given by the witch doctor a macerate of African bull frog which was secretly mixed into their habitual food. The schizophrenic reactions observed in these patients were intensely colored by perceptual errors, delusions of persecution, auditory hallucinations, confusional states, and episodes of extreme motor violence including the murder of relatives.

All the members of my sample were free of any organic, neurological, and/or parasitological disease. None of their ancestors on either parent's side had ever shown signs of psychiatric disorder.

Consequently I tentatively concluded that the frog must have contained some schizophrenogenic substance. I sent a letter to the Institute of Medical Research in Johannesburg, but their answer was negative regarding the presence of such a chemical substance. Yet my logical reasoning appeared correct in the sense that an underlying trend of causality linked the ingestion of the frog macerate and the explosive schizophrenic reaction that followed.

During the illness treated in my hospital the patients' talk with the possessing spirits was unmistakably clear and astonishingly strange. The spirits were ordering the patients to revolt against certain crucial cultural magical compulsives. For instance, "Not ever you again ought to kill twins." "Forbidden fruits can be eaten safely—they are offered you by the gods." "Do not believe that by eating them you will eat yourself, for you are one and the fruits the other." And the spirits would continue, "Join the women in the cultivated fields without fear to bring about by sexual contamination of the plants their lasting destruction with consequent famine to your people." Several metrazol IV injections stopped this extraordinary communication. The patients were discharged completely recovered. To my amazement I found

in follow-up interviews more than a year later that these natives were fulfilling quite what they had been taught by the "spirits," yet they denied the existence of those agents. Rather, they would say, "What a wonderful dream we had; the true God had spoken."

It was only recently that bufetonin—a schizophrenogenic alkaloid—was discovered in the tissues of certain toads. The natives had in all probability been given a substance of similar chemical structure.

For these natives the breakdown of magical thought that had resisted 500 years of Western attempts at civilization had been replaced by Aristotelian thought patterns. It was accomplished through molecular brain transactions (as complementary correlates of schizophrenic perceptions) under the transactions operating at the intramolecular level due to the schizophrenogenic pharmacological action of bufotenin.

COMMENTS

1. With regard to the schizophreniclike syndrome following exposure to magical frightening situations, there is stimulation that carries some messages from the sensory organs to the cerebral cortex, while others enter the brain stem to become intermingled with nervous networks within the reticular activating system. Via these collaterals, mental representations are integrated with previously stored information in the brain. The proprioceptive representations ascending upwards along the spinal cord reach into the brain stem and hypothalamus. By the same vein the mental representations may be integrated with emotional states coded in the hypothalamus and limbic systems. These mental perceptual events are transformed into neural events and coded as memory in the brain. Now from the cortex the messages of catastrophic anxiety are transmitted to the hypothalamus and through it to the master gland, the pituitary. This gland releases a corticotripin

ACTH which in turn stimulates the adrenals and increases the formation of corticosteroids and catecholamines, namely dopamine and norepinephrine, neural transmitters.

On the other hand, the hypothesis that corticosteroids have an immunosuppressive effect appears well founded, as well as the hypothesis that the release of catecholamines hastens the structural organization at least of some antigen-antibody complexes and reactions typical of allergic phenomena.

The fact that we find 80 percent of schizophrenic-like syndromes classic in their format but accompanied by typical allergic reactions in several parts of the body leads us to the final hypothesis that any alarm reaction or catastrophic experiential anxiety may evoke in genetically predisposed individuals schizophrenic-like reactions which, if our interpretation proves correct, belong to the category of allergies in part.

2. Regarding the 80 percent of natives that react with schizophrenic symptoms after continuously and exclusively eating alien foods, it appears also reasonable to hypothesize that the psychotic symptoms exhibited were at bottom of an allergic nature.

3. Most difficult to explain is the series of insightful reactions shown by 50 schizophrenic patients who had become acutely psychotic after the ingestion of a macerate of frog which we know now to contain a psychogenic substance called bufotenin. I will try to advance a probably debatable, but testable, hypothesis. My explanation of the fact that the psychotic native through the influence of the bufotenin was capable of sealing over the bridge existing between unconscious cultural concepts and real, objective, Aristotelian reasoning (in other words, that the natives developed that type of integrative event called insight, i.e., the ability to decode the underlying deeper order of their culture or language: the logical arrangement of unconscious meanings and relationships of which they had never been aware, and which they were never able to

explain in terms of the meaning of their overt behavior as representing the true meaning of their actions, thinking, and feeling) is most extraordinary.

For the psychoanalyst the development of insight is easily explained in the light of Freudian theory, but the radical statement I would like to make here is that the Freudian explanation may have in fact a pervasive neurophysiological basis. As you all know, we have two brains, right and left. Our purpose here is not reductionistic, i.e., reducing psychology to neurology. For mental events for us are far from being identical with processes in the brain —are no more or less than complementary. For neither the subject nor the outside observer can possibly apprehend simultaneously a mental representation in the mind and a neural representation.

When the hypothetical observer "O" looks at the brain of an individual precisely at the moment this subject "S" is having a mental representation, the visualization of "O", according to Cordon Globus, is a representation of the representation of "S" and consequently not identically the same thing at all. This way of thinking of course is a debatable extrapolation of Niels Bohr's complementary principle stating, as you all know, that the position and momentum of an electronic phenomenon (as they cannot be observed simultaneously according to the Heisenberg's principle of indeterminacy) can only be understood by stating that the position of an electron is complementary to its momentum, or conversely that the momentum is complementary to its position.

What I really intend to state as a tentative explanatory proposition is that bufotenin opened the gates for the transmission of unconscious meanings stored in the left hemisphere to the right by means of neurophysiological molecular mechanisms. These speculations are based on the dramatic results of the studies of R.W. Sperry at the California Institute of Technology and of his students. All of their conclusions have been extensively documented.

In fact, in studies of commissurotomy (separation of the brain) the two cerebral hemispheres reveal themselves as having essentially different cognitive functions. After separation both halves appear conscious, or, in other words, as David Galin implies, we all after all have two minds not identical functionally but rather with different roles.

David Galin states: "It is generally agreed that in typical right-handed people, language processes and arithmetic depend primarily on the left hemisphere and that the right hemisphere is particularly specialized for spatial relations and some musical functions." Do we have grounds for the hypothesis that bufotenin (found also in chicks and the human brain) might have been in part responsible for the breakdown of the inhibitory mechanism of neuronal transmission across the cerebral commissures?

It has been hypothesized that the presence of bufotenin in the brain acts as an hallucinogenic substance derived from serotonin by the enzyme-indola-mine N-methyltransferase. Does this hypothesis carry enough weight of probable verifiability?

On the other hand, the schizophreniclike syndrome observed in two groups of 100 natives and the signs of allergy previously described constitute an impressive picture in the sense that both the classical schizophrenic manifestations and the phenomenology of the somatic allergic reactions inject into the unbiased observer the almost inescapable belief that they are logically integrated parameters of one single whole. This impression has been recently validated mostly by members of the Academy of Orthomolecular Psychiatry.

If at least certain forms of schizophrenia are the result of brain dysfunctions caused by the interaction of antibodies and antigens —antigens brought into the organism by certain foods or indirectly by enzymatic molecular changes as derivatives of exceptionally high emotional experiences to which the individual is exposed in life, or still if the disease

may also have at least a component of an auto-immune disorderly mechanism, is a matter of great concern for all of us. Inevitable, however, is the inference that these brain dysfunctions are ultimately explainable by Linus Pauling's theory of Orthomolecular psychiatry. In his mathematical differential equations of quantum physics, Linus Pauling axiomatically postulated formulations which were amenable to the logical conclusion that molecules in general, and DNA and RNA in special, undergo a process of intra-and inter-atomic evolutive resonance that in healthy conditions leads to a stable molecular structure operating at a minimum level of energy thanks to a self-determined ideal architecture of atomic bonding. Linus Pauling's theory, formulated in 1930, brought him the Nobel Prize in chemistry and has been absolutely confirmed ever since.

From this theory it follows that any change in the molecular environment that introduces perturbation in the modulation of the molecular resonance is conducive to a breakdown of a vital negative feedback enzymatic mechanism which may culminate in the structuring of abnormal patterns of inter-atomic bonding and the formation either of abnormal amounts of catecholamines, like dopamine that run along brain tracts, and/or anti-detoxification enzymes and certainly many other lethal manifestations yet to be discovered.

The mind-brain-complex mechanism may be said from this viewpoint to be a constant series of resonant centers of vibrancy in the process of transformation—acting as a chain of cybernetic loops, an "elan vital" of creative energies all along the evolution of men in its selective survival of the fittest.

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