

Human and Animal Physiology

Adversities of Ivane S. Beritashvili: Overcoming Them Throughout Life

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ABSTRACT. This short review is devoted to vicissitudes of life one of the outstanding physiologist of the 20th century Ivane S. Beritashvili (1884-1974). He was graduated from St. Petersburg University (1910) and for five years worked at the University Laboratory under supervision of N. Wedensky. Unfortunately, Beritashvili was afflicted by an adversity seldom encountered, the rejection of his thesis by his mentor. Beritashvili, therefore, had to leave St. Petersburg and move to Odessa (1916). After returning to homeland, he founded Department of Physiology (1919) and Institute of Physiology (1935) at the University of Tbilisi. Among his many contributions is the discovery of the rhythmical course of reciprocal inhibition in spinal reflexes (1911). Beritashvili was the first to demonstrate the excitatory and inhibitory reactions of brain stem reticular formation (1937). After important studies on the psycho-neural mechanisms of animal behavior, he made his most significant contribution by suggesting that such behavior is mediated by the image-driven memory (1947). For his unorthodox doctrine, (*vis-à-vis* Pavlov) Beritashvili was removed from his position of Director of Physiology Institute as being “anti-Pavlovian” and endured five years of isolation from science. Fortunately, in 1955 after Stalin’s death, he returned to his research and extensive work for the remaining 20 years was crowned by the publication of his most known volumes. © 2010 Bull. Georg. Natl. Acad. Sci.

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Essentially all scientists encounter adversity at various stages of their career, if nothing else than the failure of a favorite experiment to produce the expected results. Most common, of course, is the fact that much of the literature in the field of interest lies in a language unfamiliar to the investigator. This, particularly in the polyglot community of scientists in the early 1900’s, was true for Ivane Beritashvili [1,2,3,4]. He was born in a provincial community that spoke Georgian, not an index for success in the Russian Empire of the time; and even Russian itself was and remains something of an unfamiliar accumulation of undervalued results. Thus, on his way to the St. Petersburg University in 1906 Beritashvili had

to master not only the Russian of the Empire, but the German, French and English in which the science was written. It is noteworthy that from 1912 to 1929, he published 42 papers in German and English; but following the Bolshevik pressure from then on, his publications were essentially all in Russian.

However, Beritashvili was afflicted by an adversity seldom encountered, the rejection of his thesis by his mentor, Wedensky (1852-1922). Beritashvili’s results had disproved those of Wedensky. It was not until 1935, when Beritashvili stood next to Pavlov as the leader of Russian physiology, that he received his Doctoral (honorary) degree from St. Petersburg (Leningrad) University.



Ivane Beritashvili (1945) – a founder of Physiology and Neuroscience schools in Georgia.

Fortunately, before that Wedensky administered Beritashvili's learning to use the newly invented string galvanometer. This in turn gave Beritashvili the tool to become the founder of the field of spinal cord electrophysiology as testified to by Lord Edgar D. Adrian [5]. In addition, Wedensky secured him a fellowship with Rudolf Magnus (1873-1927), who had been a pupil of Charles Sherrington (1857-1952). Later Sherrington and Adrian shared Nobel Prize in Physiology (1932). Adversity intervened, however, and the fellowship was promptly terminated by the onset of World War I.

Beritashvili was then able to obtain a position at Novorossiysk, a university in Odessa, the standing of which may be appreciated by the fact that it was where Sechenov (1829-1905) was "exiled" for his publishing a book condemned by the Tsarist regime. In the meantime, Georgia was involved in tumult, first with three years of freedom sponsored by Germany under a Menshevik government, followed by the Bolsheviks murdering the Mensheviks to take over. Somehow, throughout this turmoil a University of Tbilisi had been established.

Among the achievements of his time in Odessa and startup in Tbilisi, studying memory, was his basic abandonment of the conditioned reflex paradigm of Pavlov. He went instead in a new direction, the use of free behavior [6,7]. While this earned him much credit, and as noted above, placed him next to Pavlov as Vice President of the International Physiological Congress in Leningrad-

Moscow in 1935, it came to be a flail with which he was beaten. This was the greatest and most dangerous adversity in that it was pursued in the early 1950's during the Stalinist terror. As a consequence he was removed from his position of Director of Institute of Physiology as being "anti-Pavlovian" and endured four years of isolation from science. Although during that period, he produced a singularly unique volume on human nature in ancient (IV-XIX) Georgian manuscripts (Pict. 1).

Finally there is the peculiar adversity that he and his student, Nina Chichinadze originated the "split brain paradigm" for study of the interhemispheric transfer of memory, yet the world knows little or naught of their achievement. These experiments were produced from 1935 through 1940 and, in pigeons, demonstrated not only the unilaterality of a memory but the pathway by which it was accessed by the "ignorant" hemisphere [8-10]. Save for the work of Köhler [11,12] this was an absolutely unique and extraordinarily productive concept [13,14].

The question then arises as to the relationship of the Tbilisi work to that which arose in the West consequent to the comparable discoveries of Ronald E. Myers [15]. From the work of Levine [16-18], who repeated and confirmed the Tbilisi studies, we know that at least the first paper of the Tbilisi series had reached Carl Lashley at Harvard, and was also known to Roger Sperry [19] who did a comparable experiment on fish. However, the intervening war (again!) probably precluded transmission of most of the information to Western laboratories. Thus, the adversity stands that the war almost eliminated credit to Beritashvili and Chichinadze, for having conceived and demonstrated the "split-brain" procedure. Later in 1981 Sperry was awarded by Nobel Prize in physiology on the functional specialization of the cerebral hemispheres.

Interestingly, the adversity also seems even to have followed the "split brain" procedure into its continuation in Western science. The point here is that Ronald E. Myers essentially alone had thought through the possibilities and did the surgical and behavioral confirmation of their correctness. In other words, Myers was the sole "inventor" of the split-brain procedure in vertebrates.

So, by circumstances far beyond their control, Beritashvili, Chichinadze and Ron Myers have experienced the adversity of being largely deprived of the renown they so richly deserved.

Concluding this short review we would like to emphasize that the vast international turmoil and antagonism that prevailed throughout most of Beritashvili's scientific life, plus barriers of language, which he strove so hard

to mitigate, ultimately conspired to limit the influence of his extraordinarily important and unique ideas and relegated them to relative obscurity. Fully appreciated, they should have had a major impact on the study of

animal behavior and memory. Their attractiveness is certainly enhanced by knowledge of the fact that their author evolved them a lifetime of rigorously controlled and highly imaginative experimentation [20].

ადამიანისა და ცხოველთა ფიზიოლოგია

ავბედითი დღეები ივანე ბერიტაშვილის ცხოვრებასა და სამეცნიერო მოღვაწეობაში

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სიცოცხლის შემსწავლელ მეცნიერებათა ცენტრი (ყოფილი ფ. ბერიტაშვილის სახ. ფიზიოლოგიის ინსტიტუტი), თბილისი

(წარმოდგენილია აკადემიის წევრის ფ. თოდუას მიერ)

სტატია ეძღვნება მე-20 საუკუნის გამოჩენილი მეცნიერის, აკადემიკოს ივანე ბერიტაშვილის დაბადებიდან 125 წლისთავს. მასში მოკლედ მოთხრობილია იმ სიძნელეების შესახებ, რომლებიც მას გადახდა მრავალმხრივი სამეცნიერო მოღვაწეობის რთულ გზაზე. სანტ-პეტერბურგის უნივერსიტეტის დამთავრების შემდეგ (1910) ფ. ბერიტაშვილმა მუშაობა დაიწყო ცნობილი რუსი ფიზიოლოგის ნ. ვედენსკის ხელმძღვანელობით. მის ლაბორატორიაში ფ. ბერიტაშვილმა აღმოაჩინა ზურგის ტვინის რეფლექსების რეცეპტორული შეკავების რიტმული ბუნება (1911). მოსწავლესთან პრინციპული უთანხმოების გამო ვედენსკიმ არ მისცა ბერიტაშვილს სამაგისტრო დისერტაციის დაცვისა და ლაბორატორიაში შემდგომი მუშაობის საშუალება. უსახსროდ დარჩენილი ახალგაზრდა მეცნიერი იძულებული შეიქნა დაეტოვებინა სანკტ-პეტერბურგი და სამუშაოდ გადასულიყო ოდესის უნივერსიტეტში (1916). სამშობლოში დაბრუნების შემდეგ ბერიტაშვილმა თბილისის უნივერსიტეტში დააარსა ფიზიოლოგიის კათედრა (1919), ხოლო შემდგომ ფიზიოლოგიის ინსტიტუტი (1935). მან პირველმა გამოიკვლია ტვინის ღეროს რეტიკულური ფორმაციის ამაგზნებელი და შემკავებელი რეაქციები (1937). ფ. ბერიტაშვილმა უდიდესი წვლილი შეიტანა ცხოველთა ქცევის შესწავლის დარგში, აღმოაჩინა რა, რომ ცხოველთა ქცევა და სფეროთი ორიენტაცია გარემოში წარმართება ხატიანობით მქსიერებით (1947). მისი კონცეფცია მიუღებელი აღმოჩნდა პავლოვის სკოლის წარმომადგენლებისთვის, რის გამოც ფ. ბერიტაშვილი „ანტიპავლოვისტად იქნა შერაცხილი“. საბედნიეროდ, სტალინის გარდაცვალების შემდეგ უკლებლად ყველა, ერთ დროს პავლოვის მოძღვრების მტრად გამოცხადებული მეცნიერი, მათ შორის ბერიტაშვილიც, დაუბრუნდა თავის სამუშაოს. სიცოცხლის უკანასკნელი 20 წლის დაუღალავი შრომა დაგვირგვინდა ბერიტაშვილის ყველაზე ცნობილი მონოგრაფიების გამოქვეყნებით საბჭოთა კავშირსა და ამერიკის შეერთებულ შტატებში.

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