

ARTHUR KOESTLER'S OSCULATION WITH LAMARCKISM AND
NEO-LAMARCKISM

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Arthur Koestler (1905-), a maverick in scientific investigation, has only recently been accepted by some of his contemporaries in the field of the history of science. He calls for a reinvestigation of the Lamarckian experiments done by the Viennese scientist, Paul Kammerer (1880-1926). Koestler identifies with the work of Kammerer and Lamarck. He has in common with these two men the same non-traditional approach in search for the road that leads to the truth. Koestler calls for a less rigid, less materialistic tendency toward viewing former scientific work. Kammerer claimed to have modified land breeding midwife toads (*Alytes obstetricans*) and to have reproduced them in a watery environment. During the adjustment to the physical transformation, the male midwife toad developed nuptial pads on its fingers in order to grasp the female during the mating period. The midwife toad originally inhabited aquatic surroundings, but emerged on land many generations ago. In dry conditions nuptial pads are not biologically needed.

This writer has attempted to duplicate Kammerer's experiment with a related species, *Bombina orientalis* but, unfortunately, due to lack of funds, had to terminate the experiment without obtaining any results.

Arthur Koestler (1905-) has been writing for the past fifty years on scientific, political and ethical issues. He has never been formally accepted as a historian of science by the orthodox academic community, but rather as a journalist and popularizer of the history of science. He was born in Budapest, and in 1922, enrolled in the University of Vienna where he studied both physical and biological sciences. At that time he said, "The heroes of my youth were Darwin and Spencer, Kepler, Newton and Mach; Edison, Hertz and Marconi—the Buffalo Bills of the frontiers of discovery."¹ He left the University without completing the requirements for his degree, but due to his skill in writing, he was able to enter into the field of scientific journalism.

In 1931, at the age of twenty-six, his reputation as a scientific journalist qualified him to be chosen as the only journalist to participate in the Arctic voyage and explo-

ration made by the famous Graf Zeppelin. During World War II, he served in the French and British armies. Following the war, he became a British subject and settled in England. In 1957, he was made a Fellow of the Royal Society of Literature, and between 1964-65 he became a Fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford University in California. In 1968, he was honored with the Sonning Prize at the University of Copenhagen for his writings dealing with various aspects of European institutions and their cultural advancement. In the same year, Queen's University, Kingston, Ontario, Canada bestowed upon him the honorary degree of Doctor of Laws for his contribution to world knowledge.

His newly accrued academic honors did nothing to ease his discontent. He felt that the recognized authorities in the field of the history of science still saw him as a popular fiction writer. In a conversation with the writer, Elizabeth Hall stated: "You are much in evidence at a great many academic functions." He commented: "I am surprised that they accept me, for I am entirely nonacademic—except for an honorary Doctor of Law."² Arthur Koestler has consistently expressed the scientific view that neo-Darwinism does not fully explain the direct cause of variations in species.³

Koestler is ambivalent towards the claimed accomplishments of Lamarckism and neo-Lamarckism. Sometimes he supports the belief in the Lamarckian interpretation of nature, and at other times, expresses a concern that neo-Lamarckism is not superior or more authentic than neo-Darwinism in understanding nature's way. Koestler makes this point when he cites several neo-Lamarckian experiments which have failed to confirm the theme that acquired characteristics are inherited.

Koestler for the past fifty years has been possibly living with a narcissistic transfer to Lamarck. History has not been kind to either of these men and neither has received academic acceptance from most professional historians of science. The principal historians of science agree that change in species occurs through the action of the blind force of natural selection within the framework of Mendelian principles. These historians do not consider the Lamarckian interpretation, of the causal antecedent for change and development in species, to be biologically trustworthy. It appears that Koestler's emotional tie with Lamarck stems from his identification with Lamarck's rejection by the historians in the field of science. Perhaps this identification provides for Koestler a Rankian "double", who can furnish a solution for his search towards lasting fame as a historian of science.

Koestler has spent most of his professional life attacking pseudo-Darwinian farrago. However, in his book, *Insight And Outlook*, Koestler writes, "As for Lamarck's theory of the causes of evolution, it failed to account for a whole range of known facts, including Darwin's own observations; and unlike Lamarck, who was rash with hypotheses, Darwin had a profound respect for facts and was always ready to modify a theory accordingly."⁴ The formation of callosities in both animals and

man fascinated Koestler. He used the predisposition for this characteristic as an example to demonstrate the natural tendency for inheritance of an acquired distinctive property.⁵ John Beloff, Senior Lecturer in the Department of Psychology of the University of Edinburgh, writes of Koestler's "flirtation" with Lamarckism. He notes that although the toughness of the soles of the feet of the adult which can be seen in the embryo, can be explained easily by Darwinian theory. Nevertheless, Koestler, specifically with resolution, declares this example as the evidence to substantiate the Lamarckian postulate of the inheritance of acquired character.⁶

In his invaluable work, *The Case Of The Midwife Toad*, Koestler offers a prolegomenous study of the claim by the neo-Lamarckian Austrian scientist, Paul Kammerer (1880-1926) to having resolved the Lamarckian-Darwinian controversy through laboratory experiments. He insisted that the results of crucial tests with the species *Alytes obstetricans* (midwife toad) gave absolute affirmation that modification of structure and function caused by environmental factors were inheritable. Kammerer's investigation began by collecting midwife toads who were originally from an aquatic habitat but moved to a terrestrial environment many aeons ago. With great care, he slowly attenuated them back into the aquatic environment and in seven generations he observed the successful mating in their primeval watery environment. Living on land for long periods of time the males no longer had the biological need (besoin de)⁷ for the development of callosities and nuptial pads to grasp the female. On the male midwife toads, nuptial pads are the swellings on the palm and fingers needed to prevent the male from dropping back into the water, whereas living on land, the dehydrated skin of the female did not require any special protrusions on the male for the reproductive process.

In 1921, Richard Wolfgang Semon a physician, zoologist and extraordinary professor at Jena University, taught that any action or agent that causes or changes an activity in an organism can engender itself in the form of an engram which then can be expressed in future generations as a product of somatogenic inheritance. His complex and forgotten book, *The Mneme*, elaborated on this Lamarckian concept. Semon was fascinated by Kammerer's work and presented one of the best detailed accounts of the midwife toad experiment.

He wrote:

A remarkable advance in parental care is shown by a European species of toad, *Alytes obstetricans*. With the Obstetric Toad, the fertilisation and deposition of the eggs take place on land. The number laid is far smaller than with other Batrachians, but the eggs are relatively large and light in colour, and contain more yolk. The male assists in the process, not only by squeezing the eggs out of the female, but also by pulling and pressing them with his hind legs. In the absence of water, the glutinous envelopes of the eggs do not swell up nor lose any of their stickiness. On the contrary, they adhere to the hind legs of the male, and, in consequence of his continual movement, the egg-strings are gradually wound about his legs. A few hours later the viscous envelope hardens and shrinks

and loses its stickiness, but the spawn-strings remain closely adherent to the legs of the male. If the spawn-strings do not adhere at once, the animal tries by repeated twisting round to give them the right position. The eggs safely deposited, the male *Alytes* burrows into the damp earth until the larvae emerge.

By external influences, Kammerer in a simple manner induced the Obstetric Toad to return to the more original propagation habits of ordinary toads and frogs. He kept the animals in a room at high temperature (25°-30°C), until they were induced by the unaccustomed heat to cool themselves in the water-trough placed at their disposal. Here the male and female found each other, and the clutching of the female by the male and the fertilisation and deposition of eggs took place in the water. Under these circumstances, the glutinous envelope, coming into contact with the water, at once swelled up and lost its stickiness. Thus, it was rendered impossible for the male to affix the spawn-strings to his hind legs. After a number of fruitless attempts on the part of the male, the egg-strings were left in the water to develop in the ordinary way.

By the repetition of these experiments during several mating periods, the animals gradually accustomed themselves to copulate in the water, and to deposit the eggs without any attempt by the male to twist them round his legs. Finally, when the coercion of the high temperature was entirely withdrawn, the creatures went through the whole process of sexual intercourse in water of normal temperature. The number of eggs, however, increased; the eggs themselves became smaller, poorer in yolk and darker in colour until at last the resemblance to the eggs of the common frogs and toads was almost complete.

Now just as this modification of the propagating and breeding instincts in the parents grows into a settled norm, so it appears in their progeny. Kept at normal temperature, the sexually matured offspring of such parents make for the water at the approach of their first breeding period, and deposit their strings of numerous small and dark eggs without attempting to take any further care of them. In the ontogenetic development of this generation, and still more in the case of later generations, reversions into the ontogeny of the more primitive tailless amphibians take place; but into that we shall not here attempt to enter.

We shall concern ourselves simply with the appearance of a group of characters which in the fully developed *Alytes obstetricans*, seemed to have entirely disappeared. The males of frogs and toads copulating in water possess, as secondary sexual characters, peculiar breeding pads, which enlarge during each breeding season. These pads are so characteristic that their location and configuration are very important for purposes of classification. Their biological value consists in making it possible for the male to embrace the female in the water, and to this end a morphologically very pronounced hypertrophy of the forearm-musculature appears, in consequence of which the shape of the limbs assumes a very characteristic, inward curve. These secondary sexual characters are absent in the normal male *Alytes* copulating on land. At any rate, they were entirely absent in the many hundreds of specimens used by Kammerer in the elaboration of his experiments. When Kammerer coerced the animals, in the manner already described, to copulate and to deposit their eggs in water, no indication of these breeding pads appeared even when this mode of propagation became usual. No sign of the pads appeared in the first progeny bred under those conditions. But in the second progeny, roughnesses appeared on the thumb and on the thenar eminence; and in the third progeny, all the sexually mature males were furnished

with typical, grey-black coloured pads on the upper side of the thumb and on the thenar eminence. At the same time there was an excessive development of the musculature of the forearm, and with this an inward curvature of the fore-limbs, which meant that the palmar surface of the hand was pressed on the ground nearer the median line.

Here we have exceptionally convincing evidence for the fact that, under the influence of stimulations continued through four generations, a branch of an engram-succession long obsolete is brought again into use. Primitive morphogenic engrams are reawakened, and their ephory is manifested in new reactions. Morphologically, the case is one of the reappearance of an atavistic character; viewed as the manifestation of instinct, it is an instance of the substitution of the neotenic obstetric instinct by the atavistic one of copulation and the deposition of eggs in water.

In conclusion, the attention of the reader is directed to the fact that, in all cases quoted in this chapter, the course of the ontogenetic alternative depends entirely and without exception on the strength of external influences. These are open to close analysis, whether the course of the ontogeny is in the direction of dimorphism or polymorphism, of neoteny or atavism. This fact of the possibility of analysis has been my guiding principle in the selection of illustrative material.⁸

Kammerer's experiments were labeled fraudulent by the noted neo-Darwinist and Cambridge scientist, William Bateson (1861-1926), whose pronouncement was confirmed by Professor G. K. Noble (1894-1940) of the American Museum of Natural History, when he visited Kammerer's laboratory in Vienna to scrutinize the single preserved specimen of the midwife toad. At the time of the examination the experimenter was not present but preparing to organize a biological laboratory in the Soviet Union. Nonetheless, it appears that Dr. Noble had Kammerer's permission to systematically probe the transformed specimen. After a meticulous inspection, Dr. Noble proclaimed that the conserved organism was injected with India ink in order to create and represent nuptial pads. The findings declaring this alleged falsification to the scientific world was published in the prestigious British journal, *Nature* in 1926.

Later Noble adds: "Although many modifications produced during ontogeny resemble heritable features of other species, this is no evidence that the modification frequently repeated can impress itself on the germ."⁹

Kammerer was confronted with the allegation of tampering with the evidence and presenting bogus testimony to the scientific community; in an attempt to justify his eagerness and determination by establishing the validity of his assertion that characteristics are inherited. The community of defamers were led by geneticists William Bateson and Richard B. Goldschmidt (1878-1958). Gregory Bateson, son of William, informs us as to his father's attitude towards the Lamarckian position. In his early biography Gregory reports this passage: "He knew that the Lamarck position was intolerable anyway, that the effects of environment were not going to be inherited."¹⁰ Unluckily for the neo-Lamarckians, William Bateson was prejudiced to the Lamarckian axiomatic propositions, be they true or otherwise.

Richard B. Goldschmidt critically attacked the validity of Kammerer's experiments. He claimed that the generations of time necessary to prove Kammerer's theme were impossible to accomplish in the span of time allotted for successful proof of his theory.¹¹

In spite of these maligning attacks, Kammerer, in his self-examination, offered a conspectus of his philosophical outlook as an answer to the neo-Darwinian barrages of counterfactual speculation. Kammerer continued to stress his earlier experience, as reported in his book, *The Inheritance of Acquired Characteristics*. He referred his caluminators to his text containing this passage: "Development of the nuptial pad on the forearms of the male Midwife Toad, *Alytes obstetricans*, when bred in water (Kammerer 1909, 1919)."¹²

In spite of the fact that Kammerer was labeled a falsifier of scientific experiment, he was offered a Chair in Genetics at the Pavlov Institute in Leningrad. The Soviet government gave no credence to these unpropitious rumors for various scientific and political reasons. The untried Soviet Academy of Science needing strong leadership and desiring a renowned European scientist who had to be a Marxist, chose Kammerer. Kammerer's sympathies with the doctrines and methods of international socialism were well established. Shortly after deleterious gossip concerning his integrity spread throughout intellectual circles in Europe, Kammerer killed himself. Kammerer's premature death deprived the world of possible scientific breakthroughs.¹³

Koestler, in *The Ghost In The Machine* (1967), *The Roots Of Coincidence* (1972), and *Janus* (1978), compares Lamarckism to Darwinism in explaining the pathways taken by evolutionary inheritance. The neo-Darwinian way of life offers the explanation that change occurs through the agencies of chance variation enforced by natural selection. On the other hand, neo-Lamarckians defend the thesis that the influence of the environment expresses itself on species' vital needs.¹⁴

CONCLUSION

Koestler's calling is an appeal to traditionalists to consider other methods of reasoning, namely, to draw on more humanistic tendencies when seeking the meaning of life in terms of growth and evolutionary development. Koestler questions the fact that Kammerer was labeled a failure; in the past fifty-five years of scientific experimentation no scientist has taken the time and effort to verify the validity of Kammerer's data (midwife toad) and expose the truth. Koestler is a defender of Lamarck and Kammerer because their works were evaluated and viewed by the standards set by orthodox science at that time. Koestler's humanistic values call for seeing the good in Kammerer's work, and not rejecting it on the grounds of a possible act of chicanery. As this century draws to a close, Koestler's invocation is a petition for scientists to right a past wrong. Koestler fears the current generation of mechanistic scientists lack the humanistic feeling necessary to reinvestigate Kammerer's experiments.

He is aware that their timidity may be due to an eventual identification with the image of Kammerer.

The tender loving care that Kammerer displayed to his experimental animals did not evoke respect but ridicule, and was used to debase his attractive personal appearance and his adherence to humanitarianism. Once this was accomplished, no respectable scientist was willing to repeat these experiments in fear of impairing his/her scientific reputation in addition to hesitancy and lack of confidence in oneself.

Stephen Jay Gould, Professor in the History of Science at Harvard University, in his review of *Janus*, and of other works,¹⁵ sees Koestler as a nineteenth century vitalist and also identifies him as blindly championing the cause of Lamarck. The possible reason for Gould's carping at Koestler is to stifle Koestler's appeal to the present scientific experimenters to investigate anew Kammerer's claim.

Charles Coulston Gillispie, Professor of the History of Science at Princeton University, and Herbert Butterfield, Professor of Modern History at the University of Cambridge, both appear to stress the need for further use of new insights.¹⁶

This challenge remains to be answered by the strict neo-Darwinians to allow other doors to be opened before reaffirmation of their points of view in investigating scientific matters. This writer has attempted to duplicate Kammerer's experiment with a related species, *Bombina orientalis*. Since this species is already a water toad, this experimenter endeavored to first wean the toads to reproduce in a more earthly environment, and then planned to recondition them to indulge in amplexus in their original aquatic habitat. Unfortunately, due to lack of funds, the experiment had to be terminated without any results.

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