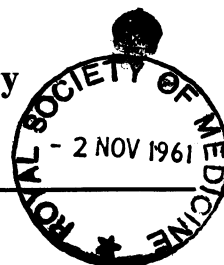


Section of Radiology

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Paper

A O Kovalevski and the Neurenteric Canal: A Note on Some Historical Inaccuracies

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In a recent paper J R Smith [21] has attempted, because of a 'considerable confusion in the present classification and nomenclature of accessory enteric formations', to provide a practical classification founded on the basic embryological deviations. This effort has been to a great extent successful but there is still confusion as to the nature of the deviation. Dorsal enteric remnants, including fistula, sinus, cyst, duplication, diastematomyelia, and the characteristic abnormality of the vertebra have been attributed to remnants of the neurenteric canal or accessory canals, or to a split notochord [1, 22-24].

Eponyms may have their merit but at the same time can present certain pitfalls. Recently one of us [1] in presenting a paper on malformations related to a persisting neurenteric canal of Kovalevski, concluded that there was confusion

over the identity of the man to whom the discovery of this embryonic structure is ascribed. The feeling arose that he might be virtually lost to posterity due to some unknown or unapparent twists of fate. The reason becomes immediately evident when we relate the information that can be obtained from the standard medical encyclopedias and other reference works usually consulted in such a predicament. No direct reference to Kovalevski's original description is contained in the recent and accessible medical literature or in the current embryology texts.

The student of Kovalevski's canal turning to the listed works is informed on the identity of Kovalevski in the manner shown in Table 1.

Not one of the captions below is completely correct. The name of the man we are tracking down correctly reads 'Alexander Onoufrievidh Kovalevski'. He was not an anatomist but an outstanding embryologist, who lived from 1840 to 1901. It is interesting to see what happened to the discoveries and writings of the Russian scientist.¹

¹Access to the writings of A O Kovalevski was possible through the Royal Society Catalogue of Scientific Papers Vol. 8 (1864-73) and Vol. 10 (1874-83) [2]

Table 1

1935	Gould's Medical Dictionary, 4th ed., Philadelphia	Pavel Ivanovich Kovalevski Russian embryologist 1845-
1941	Dorland's Illustrated Medical Dictionary, 19th ed., Philadelphia & London	Pavel Ivanovich Kovalevski Russian anatomist 1845-
1946	Stedman's Medical Dictionary, 16th ed., Baltimore	Pavel Ivanovich Kovalevski Russian embryologist 1845-
1948	E C Kelly: Encyclopedia of Medical Sources, Baltimore	Not mentioned
1949	H A Skinner: The Origin of Medical Terms, Baltimore	Not mentioned
1953	C Wakeley: The Faber Medical Dictionary, London	Kovalevski P Russian embryologist 1845-1901
1956	Blakiston's New Gould Medical Dictionary, 2nd ed., New York, &c.	Not mentioned
1957	Stedman's Medical Dictionary, 19th ed., Baltimore	Nikolas Opsipovich Kowalewsky Russian physiologist and histologist 1840-1892
1957	Dorland's Illustrated Medical Dictionary, 23rd ed., Philadelphia & London	Alexander Onoufrievidh Kovalevski Russian anatomist 1846-1901

Let the historical record speak for itself. In a communication entitled 'Weitere Studien über die Entwicklungsgeschichte des Amphioxus lanceolatus, nebst einem Beitrage zur Homologie des Nervensystems der Würmer und Wirbelthiere' Kovalevski [3] states

'I have recognized the contiguity of the posterior segments of the intestinal and neural tubes; i.e. their direct continuation into one another in *Acanthias* in 1867. This was published and documented in the year 1869. In *Acanthias* the embryonic plate represents a true plano-gastrula [4].

'The two embryonic leaves – superior and inferior intestinal glandular leaves – are contiguous at the borders of the embryonic plate. The primitive groove forms at these borders of the embryonic plate and extends from above to below the embryonic plate. At the time of closure of the groove, the superior portions form the medullary tube and the inferior portion mainly the posterior end of the intestinal tube. The contiguity of these two tubes in *Acanthias* persists up to the time of formation of the anus, then it disappears.

'This description was neglected by most workers in the embryology of *Plagiostoma* and in particular with reference to the special point of the communication between the posterior ends of the intestinal and neural canals. Thus, quite unjustly, Balfour ascribes this discovery to himself. Besides in the already mentioned paper in Russian, I have given reference to this point in further communications with regard to *Acipenseridae* and *Axolotl* [5, 6]. It thus should have been easy for Balfour to learn whom the original description is due to. I shall not mention Semper who also had my paper on the Development of *Acanthias* in his hands, since that article appeared in Russian.¹

'Easy Methods to Rediscover the Already Known'

Balfour himself quotes Kovalevski frequently and in his 'Treatise on Comparative Embryology' [9] in 1885 remarks, in a footnote, 'There is a striking similarity between the history of the neurenteric canal in vertebrates and the history of blastopore and ventral grooves as described by Kovalevski in the larva *Chiton*'.

From all the evidence it appears incontestable that the original description of the neurenteric canal should be ascribed to Kovalevski. We found it rather difficult to establish to whom the merit should be given of assuring his name a nook of immortality in the list of medical eponyms. The earliest reference to A O Kovalevski we could find, within the context under discussion here, is in Charles Sedgwick Minot's 'Human Embryology' published in 1892 [7]. Minot (1852–1914) was Professor of Histology and 'Human

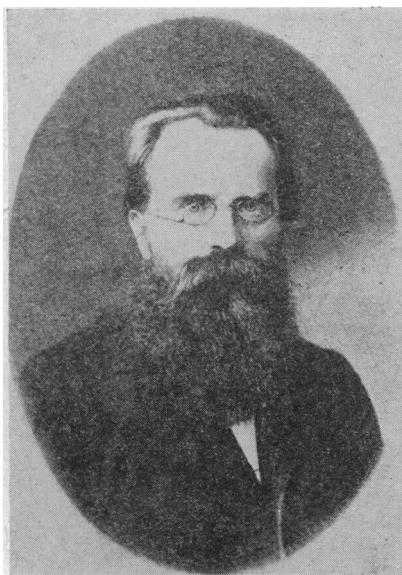


Fig 1 *Alexander Onoufrieovich Kovalevski* [17]

Embryology' at Harvard Medical School. Under the heading 'Neurenteric Canal' Minot diplomatically states, 'We owe to Balfour the identification of this canal as the blastopore. It may with propriety be termed the true neurenteric canal, or the canal of Kovalevski from its discoverer. Kovalevski first found it in *Amphioxus* and subsequently demonstrated its occurrence in various fish types'. However, Minot does not include any reference to the work of Kovalevski in this text or in his 'Bibliography of Vertebrate Embryology' published in 1893 [8]. There we find eleven references to the neurenteric canal, but no mention of Kovalevski (Refs. 1773 to 1783).

It is of historical interest that on page 191 Minot [7] writes, 'It seems not impossible that a persistent neurenteric canal may occur as an excessively rare anomaly in the adult'.

The only biographical note of Kovalevski we could find in English is the obituary by E R Lankester [10]. Biographic notes compiled with the help of the famous scientist Metchnikoff of the Institut Pasteur in Paris convey a good picture of Kovalevski's background and achievements. Besides information on his training, in great part obtained in Heidelberg and Tübingen, there are good data on his work in research (Naples, 1864, and Naples and Ischia, 1866) and as an academic teacher (Kazan, Kiew, Odessa and St Petersburg). Amongst many other honours bestowed upon him he was made a Foreign Member of the Royal Society.

¹Semper: Stammesverwandschaft der Wirbelthiere und Wirbellosen, p 15. 'Unfortunately, I cannot cite Kovalevski's paper since it is written in Russian.'

A short personal note by Lankester may be quoted here. 'Personally, Kovalevski was a man of retiring disposition, devoted to his microscopic work and of the most gentle and courteous address. He visited England with one of his daughters in October 1895 for a few days but took alarm at the dangers of the London streets and left somewhat abruptly.'

A O Kovalevski is referred to as 'an academican of St Petersburg (1844 to 1901) and an important representative of philogenetical embryology' in Nordenskjöld's 'History of Biology' [11]. The best appraisal of his importance can be gained in Locy's 'Biology and its Makers' [12]:

'Kovalevski made interesting discoveries of a general dealing. In 1866, he showed the practical identity, in the early stages of development, between one of the lowest vertebrates (Amphioxus) and a Tunicate. The latter up to that time had been considered an invertebrate, and the effect of Kovalevski's observations was to break down the sharply limited line supposed to exist between the invertebrates and the vertebrates. This was of great influence in subsequent work. Kovalevski also founded the generalization that all animals in development pass through a gastrula stage—a doctrine associated, since 1874, with the name of Haeckel under the title of "Gastraea Theory".'

The modern Russian scientists have not forgotten this pioneer of embryology. Ivanov [13] assesses the impact of his contributions at the occasion of his 100th anniversary. His objective appraisal leads up to the conclusion that 'the truly major and scientific attainments stand beyond the law of historical perspective and, therefore, everything that has been accomplished by A O Kovalevski towards the establishment of the general concept of embryology, towards the elucidation of the complex characteristics of the individual species of animals and finally towards the establishment of the principle of evolution, remain clearly and unchanged as his contribution and achievements and will as such remain in our memories'.¹ On the same occasion appeared a paper by Knorre [14], 'A O Kovalevski, the Founder of Comparative Embryology', together with biographical notes by Nekrasov [15]. Lastly, Dogel [16] wrote a book on Kovalevski which we have been unable to obtain.

As the name of Pavel Ivanovich Kovalevski has for so long mistakenly been connected with the neurenteric canal, we would like to add that he was a great physician in his own right [18]. He was born in 1845. The date of his death cannot be established. He was an outstanding neurologist

and psychiatrist and published widely. One of his works was translated into French and served as a textbook under the title 'Legal Psychopathology' [19]. His psychiatric historical sketches (1892-93) of Ivan the Terrible; Ludwig II, King of Bavaria; Nebuchadnezzar, King of Babylon; Saul, King of the Jews; and Cambyses, King of Persia are still quoted.

Finally, we must mention the third Kovalevski who lived at the same period and whose name has added to the confusion (see Stedman's Medical Dictionary, 19th ed., Baltimore, 1957). Nikolas Opsipovich (von) Kowalewsky [20] (1840-1892) was Professor of Physiology at the University of Kasan and published many basic contributions in his field.

We trust that this brief note will end the confusion created by the omissions and errors of the past. Each of these scientists deserves his own niche in medical history.

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