

January 16, 1990

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Dear Prof. John Briggs:

I am very sorry that it was not my opportunity to respond before January 4, 1990, because your letter arrived in Kiev only January 2. You have asked many questions, and each one needs serious consideration in order to give a correct answer. Hoping that you have a copy of your own letter to me, I shall give my answers in its order without repeating the entire content of the questions.

Answer 1. [to the question: **“Are there key Soviet papers and Soviet ideas Prof. Gold fails to cite ?”**]

Yes, there are many Soviet papers, articles, books and ideas of key significance dealing with the subject of the deep petroleum (i.e., oil and gas) theory which Prof. Gold fails to cite correctly or adequately.

It should be recognized that Gold’s priority [related to the subject of the modern Soviet theory of abiotic petroleum origins] must be set at 1979 when he published his article:

- 1.) Gold, T, 1979, Terrestrial sources of carbon and earthquake outgassing, *J. Petrol. Geol.*, Vol. **1**, No. 3, p. 3-19.

Concerning this article, one must pay particular attention to the following fact: The references given in that article do not contain even one of the works of any of the Soviet scientists. The well-known key leaders of the problem of abiogenic petroleum origins had already published their ideas and theory on that subject in many books and articles, beginning in the year 1951. The quantity of such publications exceeds a thousand, and for short I shall limit myself with the list of several key sources following below:

- 2.) Kravtsov A. I., 1967, Geochemical scheme of the formation of methane and liquid hydrocarbons in magmatic processes, and the basic criteria of prospects for oil and gas deposits, in *Genesis of Oil and Gas*, Nedra Press, Moscow, p. 314-325. (In Russian).
- 3.) Kropotkin P. N. and K. A. Shakhvarstova, 1959, Solid bitumens, oil and fuel gas in ultrabasic intrusions, trap brilliants and volcanic pipes, in *The Problem of Oil Migration and the Formation of Oil and Gas Accumulations*, The State Fuel Technical Press, Moscow, p. 151-164. (In Russian).
- 4.) Kudryavstev N. A., 1951, Against the organic hypothesis of petroleum origins, *Petroleum Economy*, No. 9, Moscow, p. 17. (In Russian).

- 5.) - "-", 1955, The modern state of the problem of petroleum origin, in "Colloquium on Problems of the Origin and Migration of Petroleum", Ukrainian Acad. Sci. Press, Kiev, p. 38-81. (In Russian).
- 6.) - "-", 1959, *Geological Evidence of Deep Petroleum Origins*, Trans. of the All-Union Research, Geol. Exploration Petroleum Inst., State Technical Press, Leningrad, 210 p. (In Russian).
- 7.) - "-", 1959, *Oil, Gas and Solid Bitumens in Igneous and Metamorphic Rocks*, State Technical Press, Leningrad, 230 p. (In Russian).
- 8.) - "-", 1967, The state of the question on genesis of oil in the year 1966, in *Genesis of Oil and Gas*, Nedra Press, Moscow, p. 262-291. (In Russian).
- 9.) - "-", 1973, *The Genesis of Oil and Gas*, Trans. of the All-Union Research, Geol. Exploration Petroleum Inst., Nedra Press Leningrad, 216 p. (In Russian).
- 10.) Porfir'yev, V. B., 1960, On the nature of petroleum, in *Problems of Oil and Gas Origin and Conditions of the Formation of Their Deposits*, The State Fuel Technical Press, Moscow, p. 26-40. (In Russian).
- 11.) - "-", 1967, The present state of the problem of petroleum formation, in *Genesis of Oil and Gas*, Nedra Press, Moscow, p. 292-324. (In Russian).
- 12.) - "-", 1971, On a criticism of the theory of the inorganic origin of petroleum, in "Colloquium on the Inorganic Origin of Petroleum", Scientific Thought Press, Kiev, p. 34-54. (In Russian).
- 13.) - "-", 1971, Experience of geological analyses of questions of petroleum content, *Ibid.*, p. 3-34. (In Russian).
- 14.) - "-", 1974, Inorganic origin of petroleum, *Bull. Am. Assoc. Petrol. Geol.*, Vol. **58**, No. 1, p. 3-33.
- 15.) - "-", 1975, Significance of theoretical complex of petroleum geology in the solution of the problem of commercial oil content, in *Regularities of Formation and Distribution of Commercial Oil and Gas Fields*, Scientific Thought Press, Kiev, p. 17-27. (In Russian).
- 16.) Porfir'yev, V. B., V. A. Krayushkin, V. P. Klochko, V. B. Sollogub, A. V. Cherkunov, G. N. Ladyzhenskiy and V. I. Sozanskii, 1977, *Geological criteria of prospects for new oil and gas reserves in the territory of Ukraine*, Scientific Thought Press, Kiev, 150 p. (In Russian).
- 17.) Porfir'yev, V. B., V. A. Krayushkin, N. S. Erofeev, G. P. Ovanesov, N. A. Eremenko, I. M. Mikhailov, V. A. Moskvich, I. Ye. Kotelnikov, Z. V. Ulybabov and P. M. Zozula, 1977, Perspectives of prospects for oil deposits in the crystalline basement of the Pripyat' Basin, *Geological Journal*, Vol. **37**, No. 5, p. 7-25. (In Russian).

Answer 2. [to the (compound) question: "Could he [Gold] have derived "his" theory from papers he does not cite?" and "Are the Soviet papers which he does quote peripheral to the subject so that it makes it appear that the key ideas are Gold's?"]

Gold cannot be considered to have arrived at the theory of deep gas independently, particularly in view of the Soviet literature. Evidence of this fact is given by the following.

1.)

The references mentioned above numbered 2, 8 and 11 were accompanied with their English language abstracts which stated the main theses of those works in the final pages of the book “*Genesis of Oil and Gas*” in the special English language sections of, for example, “*Symposium III: An Inorganic Origin of Oil and Hydrocarbon Gas*”, p. 682-684.]

2.)

The references mentioned above numbered 12, 13 and 17 have English language summaries (Abstracts) at the end of each article.

3.)

It should be noted also that “*The Geological Journal*”, specifically reference 17, is always accompanied with a “Contents” in English; and that reference number 14 has been published in the Bulletin of the American Association of Petroleum Geologists.

Furthermore it is well known that before Gold published his article in 1979, there were well known English language sources in the professional literature such as, for example:

18.) Dott, R. H., Sr. and M. J. Reynolds, 1969, *Sourcebook for Petroleum*, Tulsa, 471 p.

19.) Owen, E. R., 1975, *Trek of the Oil Finders: A History of Exploration for Petroleum*, Amer. Assoc. Petrol. Geol., Tulsa, 1647 p.

These last two famous books have special chapters or sections devoted to the inorganic theory of petroleum including also references to the authors Kudryavtsev, Porfir'yev and others. Additionally, many Soviet publications can be found in references contained in these two books.

These Soviet publications and the ideas contained in them cannot be considered peripheral to the subject of deep gas and the abiotic origin of petroleum in any fashion such that one might conclude, - or claim, - that the key ideas are Gold's. On the contrary, the ideas published in the references 1-16 given in the answer to question 1 are the key ideas and consist essentially of the whole of the basic but multi-faceted aspect of the modern abiotic theory of deep gas and petroleum origins. None of the key ideas are Gold's. Please read, for example, Porfir'yev's article of 1974 in the Bulletin of the American Association of Petroleum Geologists; and you will recognize that my opinion is correct upon this subject.

It is particularly noticeable that Gold cites “selectively” all of the Soviet scientific publications in such fashion as to give them only peripheral significance ! An example of such improper quoting is the manner in which Gold includes one of the Soviet articles by A. I. Kravtsov and G. I. Voitov.

20.) Kravtsov A. I. and Voitov G. I., 1976, “Evaluation of the role of faults in the gas exchange between the lithosphere and the atmosphere illustrated in southern Daghestan”, *Proc. High. Educ. Institutions. Geology and Exploration*, Vol. 19, No. 4, p. 18-26, (in Russian).

Referring to this article, Gold cites selectively Kravtsov's attainments concerning the theory of inorganic origin of petroleum in such fashion as,

"... However, the calculation of the volumetric displacement necessary to produce the wave leads to values that are quite outside the range of known land-based displacements (Kravtsov and Voitov, 1976)". (Gold, T, "Terrestrial sources ...", 1979, *J. Pet. Geol.*, Vol. 1. No. 3, p. 3-19)

Because Kravtsov and Voitov write entirely otherwise, I quote specifically these authors below from the article which Gold has mentioned in passing.

"The region [southern Daghestan] is located in a zone of high seismic activity and is characterized by variable heat flows and extremely high heat gradients, numerous springs of hot sodium chloride brines, streams of free gases, mud volcanism, breccia impregnation areas ..." (p. 18).

"The variation of the compositions of the gases reflect evidently the dynamics of alteration by deep-seated processes which are manifested by the seismic-tectonic activity of the region. ... By such the Daghestan earthquake of 14 May 1970 was accompanied by the disturbance of gas springs and of bore holes not only in the epicenter but also at great distances from its limits." (p. 23).

"In southern Daghestan, the high temperature nature of hydrocarbon gases, particularly for that portion which is manifested in the fault zones and is characterized by predominantly methane composition, cannot be in doubt. The decisive arguments testifying to such are the observed variations, during intense seismic activity, of spring and well flows, of the variation in the relations between the individual constituents of gases and of the variations of the carbon isotopic composition for the CO₂ and for hydrocarbons. These phenomena are caused by seismic-tectonic activity of the area. This activity is produced by the redistribution of rock elastic deformations the foci of which occur mostly at the depths of 30-55 km based upon calculations of the depths of the hypocenter of the earthquakes in Daghestan". (p. 24).

An additionally important content of the article by Kravtsov and Voitov is contained in their statement, "The scales of disturbance of an influence of the disjunctives (of deep faults, in the first instance) on the gas escaping into the atmosphere have not been discussed in the literature". (p. 23).

Answer 3. [to the question: "**Did Soviet scientists publish on the following four ideas, - which Gold says are uniquely his: a) Earthquakes are caused by outgassing of deep Earth methane; b) Carbonates are produced by outgassing of deep Earth methane; c) oil originates from methane; d) the astrophysical explanation for the origin of deep methane.**"]

I respond to each of these specific subjects in turn, demonstrating that Soviet scientists had addressed and published extensively upon each one prior to Gold.

a) From what has been written above, it has been shown that A. I. Kravtsov and G. I. Voitov had reported in 1976 that the earthquakes in southern Daghestan which had been the subject of their investigations had been caused by outgassing of deep earth methane.

However, the most complete arguments for this concept had been given much earlier by E. B. Chekaliuk in his following works.

- 21.) Chekaliuk E. B., 1967, *Petroleum in the upper mantle of the Earth*, Scientific Thought Press, Kiev, 256 p. (In Russian).
- 22.) Chekaliuk E. B., 1975, Energetic processes in the interior part of the Earth and their role in the formation of oil fields, in *Regularities of Formation and Distribution of Commercial Oil and Gas Fields*, Scientific Thought Press, Kiev, p. 66-76. (In Russian).

In the first of these articles by Chekaliuk, one can read for example the following:

“In a process of the deep seated synthesis of oil (from methane), the volume of mantle material decreases, and this transformation generates the favorable conditions for the sinking of the crust of the Earth and the formation of deep basins the sizes of which correspond to the scale and size of zones of petroleum reservoir formation. The accumulation and filling of such basins with water and later with sediments increases the geostatic loading in the zones of synthesis stimulating the condensation of oil and the enlargement of molecules and thereby additional sinking of those areas of the Earth’s crust.” (p. 177).

And further,

“The impetuous enlargement of a volume of hydrocarbon center favors the formation of deep faults which progress into the disjunctive disturbances from the active zone to the Earth’s surface. ... The processes of transformation of the deep oil also arise after the convective transfer of hydrocarbon center from one depth to other ones. An approach of hydrocarbon center to the surface of the Earth causes the discompacting and destruction of this center, i.e., the significant enlargement of volume.” (p. 118).

Further in that book, Chekaliuk has written that the hydrocarbon systems in the gas phase exist at depths of 200-300 km. This fluid transforms is essentially crude oil at those depths, and transforms into hydrocarbon gas (mostly methane) as it approaches the surface of the Earth.

- b) The generation of the formation of carbonates by the outgassing of deep methane is based primarily upon the original studies by I. V. Grinberg of which a more recent example is as follows.

- 23.) Grinberg I. V., 1975, Study of conditions for the synthesis of hydrocarbons and their genetic relations to kerogen-coal material, in *Regularities of Formation and Distribution of Commercial Oil and Gas Fields*, Scientific Thought Press, Kiev, p. 52-66. (In Russian).

Please note particularly Figure 2 in this article.

c) The perspective of origin of oil from juvenile methane is based upon at least two Soviet scientists, E. B. Chekaliuk and I. I. Potapov. The same perspective was also taken by A. D. Bondar.

24.) Chekaliuk E. B., 1967, *op. cit.*

25.) Potapov I. I., 1956, Genesis of bitumens and formation of oil deposits of the Apsheron in light of biochemical, geochemical, geophysical, lithological and other regularities, in *Proceedings of the Discussion on the Problem of Origin and Migration of Petroleum*, Ukrainian Acad. Sci. Press. Kiev. p. 139-155. (In Russian).

d) The astrophysical explanation for the origin of juvenile methane has been published by several Soviet scientists going back to the early 1960's and including such as the following.

26.) Levin B. Yu., 1966, Organic compounds in the solar system, in *Problems of the Origin of Petroleum*, Scientific Thought Press, Kiev, p. 174-222. (In Russian).

This particular publication contains several sections.

(1) The content of Carbon radicals in stars and interstellar space. p. 176-177.

(2) Organic compounds in planets and comets. p. 177-185.

(3) Organic compounds in meteorites. p. 186-207.

(4) Mechanical and physico-chemical evolution of the protoplanet cloud, asteroid bodies and planets. p. 208-215.

(5) Primordial organic compounds in the Earth and problem of petroleum origins. p. 215-220.
References, p. 220-222.

27.) Porfir'yev, V. B., 1960, *loc. cit.*

28.) Porfir'yev, V. B. et al., 1977, *loc. cit.*

I refer you also to my answers to your question number (1), references (9) and (16).

Answer 4. [to the question: "... about the geology of the Siljan Ring ..." and whether I "... would drill a second well there ?"]

I do not know enough about the geology at Siljan to comment upon the drilling of the Gravberg 1 well or any other bore hole there.

Answer 5. [to the question: "Will Gold's failure to find methane in the well in Sweden make it more difficult for Soviet scientists to carry out research on the deep gas theory ?"]

The hands of Soviet scientists who have developed the modern Soviet theory of abiotic petroleum origins are full (without contribution from any "attainments" from Gold, - either in the

Siljan Ring or any other way). I am hoping that the theory will become better known, in context of our overall process of “perestroika”. (Do you know this Russian word ?)

Answer 6. [to the question: **“What is the strongest evidence that you have in your own drilling in the U.S.S.R. to support the deep gas [sic] theory ?”**]

Some of the strongest evidence which support the U.S.S.R.’s drilling for deep oil and gas of abiotic mantle origin may be considered to be the following:

1.)

The existence of 80 oil and gas fields which occur partly or completely in crystalline basement rock in the west Siberian basin, including such as the Yelley-Igai and Malo-Itchskoye fields from which all of the production of oil and gas occurs entirely and solely in the aforesaid rock from depths between 800-1,500 meters below the roof of the crystalline basement, respectively.

2.)

In the year 1981 on the basis of the modern theory of abiotic petroleum origins, a group of Ukrainian geologists proposed the drilling of 10 wells for oil and gas in the Precambrian crystalline basement of the Dnieper-Donets basin (Ukrain.S.S.R). The analyses and results of this proposal were published as follows:

- 29.) Porfir’yev, V. P., V. A. Krayushkin, V. P. Klochko, M. I. Ponomarenko, V. P. Palomar and M. M. Lushpey, 1982, New directions of geologic exploration work in the Akhtyrka oil-gas-mining district of the Dnieper-Donets basin, *Geol. J.*, Vol. **42**, No. 4, p. 1-11. (In Russian).
- 30.) Krayushkin V. A., 1987, On the oil and gas content of the precambrian rock in the Dnieper-Donets basin, *Lectures of the Acad. Sci. of U.S.S.R.*, Vol. **294**, No. 4, p. 931-933. (In Russian).

The exploration drilling in the Dnieper-Donets basin for oil and gas in the crystalline basement continues presently and will be continued during the next several years.

3.)

In Tatarstan, (A.S.S.R.), the well 20009-Novoyelkhovskaya is now being drilled, having been begun November 1989. Its target depth for oil and gas is 7,000 m in the Precambrian basement rock of the southern Tatarian arch (the maximum height of the basement). The well is currently drilling at a depth of approximately 4,700 m, and the roof of the crystalline basement rock has been observed at the depth of 1,845 m. Significant petroleum shows in that well have been observed in the basement granite at depths of 4,500 m and below.

Answer 7. [to the question: **“Why do I consider Gold a plagiarist ?”**]

Concerning Gold’s plagiarism I want to say the following.

Indeed Prof. Gold puzzles me with his position by which he claims that he arrived at the deep gas theory independently, not from the Soviet literature. He was not ashamed to state this even in his paper submitted to 27-th Session of the International Geological Congress held in Moscow 1984,

- 31.) Gold, T. 1984, Contributions to the theory of an abiogenic origin of methane and other terrestrial hydrocarbons, *Proc. 27th International Geological Congress*, Vol. **13**, (Oil and Gas Fields), p. 413-442. (In Russian).

In that article, one can read the following:

“We have enumerated here the considerations that we have had on the aforesaid problems. Many of these were worked on by Soviet scientists, and in some cases we were surprised, glad and affirmed in our opinions when it was revealed that their investigations led them to the inferences and conclusions which were made by us too. In certain cases they evidently have priority in time of the most important elaboration. However, the language barrier and the defects of distribution for their publications let to [the circumstance] that we have acquainted ourselves with those ideas a long time after our publications on the same theme. We must apologize to them in several cases for the absence of references to the works of Soviet authors (Kudriavtsev, 1973; Porfir'yev, 1971).”

We, the Soviet Earth scientists who have developed, supported and promoted the modern theory of the deep abiotic origin of petroleum during the past 25-30 years are very, very sorry that Gold was not himself present in person at the 27-th Session of the International Geological Congress held in Moscow 1984; for we could have said to him directly, **“‘Gold’s theory’ is the bicycle reinvented repeatedly by T. Gold, and that only if we were to take the kindest position and if only we should not chose to evaluate ‘Gold’s Theory’ as undoubted plagiarism in all its aspects and in all its component parts (key and even peripheral).”**

Answer 8. [to the question: Do I think that “... **Prof. Gold in any way took advantage of the political situation that existed between the west and your country (U.S.S.R.) in the 1970’s and early 1980’s ?**”]

I am only a petroleum geologist and scientist, but not a political scientist, and it is very difficult for me to answer clearly and authoritatively on your question on this point. Please excuse me on this matter.

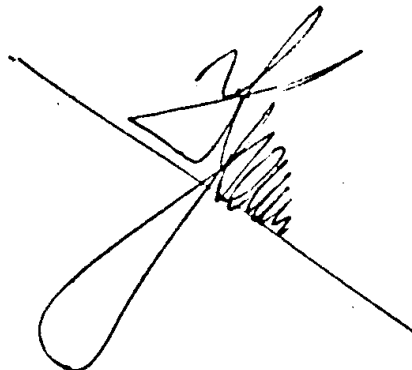
Ending the discussion of all the subjects mentioned above, I want to inform you additionally of the following. During the years 1957-1982, the leader of the Ukrainian scientific school in the field of deep abiotic petroleum origins was Professor V. B. Porfir'yev himself. Professor Porfir'yev became the leader of the Soviet school of abiotic petroleum origins after the death of Professor N. A. Kudryavstev in 1972. This school has during the past decade included such scientists as K. A. Anikiev, N. S. Beskrovnyi, Z. A. Buniat-Zade, I. I. Chebanenko, G. N. Dolenko, V. F. Derpgolts, V. I. Filippovskiy, I. Ya. Furman, V. A. Gorin, I. V. Grinberg, A. K. Ivanov, I. Kh. Kaveyev, V. P. Klochko, R. S. Kopystianskiy, V. A. Krayushkin, P. N. Kropotkin, M. N. Kudryavsteva, N. R. Ladyzhenskiy, G. N. Ladyzhenskiy, A. S. Lazarenko, B. Yu. Levin, V. F. Linetskiy, V. A. Lobov, M. M. Luspey, Yu. A. Muraveynik, V. P. Palamar, L. N. Panasenko, M.

Ye. Petrikovskaya, G. V. Rudakov, A. F. Shevchenko, O. I. Slenzak, V. B. Sollogub, V. I. Sozanskiy, S. I. Subbotin, Je. M. Tabatadze, L. N. Yelanskiy, and V. M. Zavyalov. Included among these scientist are 17 Doctors of Science, 10 Professors, 4 members of the Ukrainian Academy of Sciences, 3 corresponding members of the Ukrainian Academy of Sciences and one corresponding member of the Academy of Sciences of the U.S.S.R.

The main biographical facts (the books) and the most important events (the thoughts) from the life of V. B. Porfir'yev and his scientific school for the years between 1957-1982 were reproduced in 22 monographs, 15 symposium books, about 950 articles and in his ideas presented as papers to the three International Geological Congresses, the World Petroleum Congress, three sessions of the Carpathian-Balkan Association of the International Geological Congress, five All-Union and three Republican conferences. Much about these works were published in the article, Krayushkin, V. A., 1989, "On the way towards a new learning about petroleum", *Geol. J.*, No. 3, p. 130-135 (in Russian).

I am very flattered by your attention to my modest persona. Thank you very much for a chronology of events and documents surrounding the Siljan project, for the interesting pages from Gold's "Power from the Earth", and for your benedictionally noble intentions to highlight the Soviet scientific contributions and to clear up any misunderstanding concerning the role of the Soviet school of abiotic petroleum origins and the development and progress in the abiotic theory of deep oil and gas.

With best wishes to you

A handwritten signature in black ink, appearing to be 'V. Krayushkin', written over a large, stylized, abstract graphic element that resembles a large, elongated loop or a stylized letter 'V'.

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