

## ARE THERE TWO POTASSIUM/ARGON (K/Ar) DATING SYSTEMS?

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### ABSTRACT

In textbooks, lectures, and in the mass media, radiometric dates are presented as though they are firmly established scientific procedures not subject to question or debate. Behind the scenes, however, we find quite a different story. As just one example, Skull 1470 has been K/Ar-dated to death, and the effort has been abandoned to use K/Ar to establish its age.

### THE EARTH IS GETTING MUCH OLDER

In the heated debate for almost a century and a half between the adherents of creation and evolution, one of the key issues for most is that of the age of the earth. Evolutionists are identified with a very old earth and gradual change, while creationists are most often linked to the belief in a young created earth. Rodabaugh(1) has traced estimates of the age of the earth from 1850 to the present by evolutionists, finding that the estimates have increased from 100 million years in 1850 to 4.5 or 4.6 billion years currently. Creationists, on the other hand, have found weaknesses in Ussher's assumptions about the completeness of Old Testament chronology, but still generally hold to a young earth concept measured somewhere between 6,000 and 100,000 years. Since K/Ar dates are frequently used by evolutionists to support everything from the age of fossil man to the age of the earth itself, it is highly relevant to the ongoing debate between adherents of the evolution model and the creation model to scrutinize the assumptions and the performance record of K/Ar dating in this paper.

Historically, Darwin and his followers since his time have held that a very old earth is crucial to evolutionary theory for two reasons: (a) to allow sufficient time for non-life to change into life and simple forms to evolve into more complex forms and into new species; (b) to give the processes operating today sufficient time to account for all the strata of the geologic column - another very slow process known as uniformitarianism or its modification called uniformity. Creationists believe instead in created life forms on a created earth which was later cursed and altered by means of one or more catastrophes and therefore, they see no need for an old earth as explanation.

### EVOLUTIONARY THEORY IS CHANGING

In the past several decades there has been a marked shift among evolutionists toward catastrophic explanations for much of the geologic column (2). Then, in 1980 many of the leading authorities on evolutionary thought gathered in Chicago and faced up to the issue that the fossil record did not support the belief that small gradual changes accumulate into changes of species (3). The new view, still to be incorporated into most texts and by much of the media, is that evolutionary change may be very abrupt indeed: "Mouse today and elephant tomorrow," as Dr. Philip Gingerich, one of the world's leading paleontologists, somewhat facetiously explained in a lecture at the University of Michigan a short time later.

We see, then, that geologists are no longer really time-dependent to explain many earth forms since catastrophic actions can do in hours what formerly was explained in terms of millions of years of gradual change. Similarly, in the new view paleontologists no longer require vast quantities of time to explain changes from one species to another since it is now widely held that the infinite numbers of transitional forms between established species cannot be found simply because they never existed in the first place. It is important to note, however, that the two recent radical shifts in evolutionary thought

noted above have not been accompanied by any shift in what is thought to be strong evidence for the age of the earth. The strong evidence according to evolutionary thinking is radiometric dating.

#### WHAT IS K/Ar DATING?

Perhaps the best non-technical explanation of the K/Ar dating method is found in the book Lucy (4) from which the explanation below is derived, except where otherwise noted. Technical works by Schaeffer and Zahringer (5) and by Harper (6) may be explored by the interested reader.

The common mineral potassium, or K, contains a tiny amount of radioactive potassium which gradually decays into a stable element, argon gas. Scientists accept 1.31 billion years as the half-life of radioactive potassium, the amount of time it takes for half of it to decay into argon. The decay rate is held to be proportional to the amount of K that is left in the regular potassium, thus the rate gradually slows down over a long period of time. As time goes on in rocks containing potassium, the amount of radioactive potassium will decrease and the amount of argon will increase. Thus the success of the K/Ar dating method in this rationale depends on a very precise measurement of the ratio between the amount of radioactive potassium and argon.

A number of assumptions are made by the scientists who work with the actual K/Ar dating process, among which are the following:

- \*The initial state of the sample of rock can be determined, and the fundamental physical constants of nature have not changed over the time interval under study. While many interesting samples do not meet assumptions underlying the use of K/Ar dating, many others do, and therefore the latter can be accurately dated (7).
- \*Volcanic samples are virtually leakproof with the argon trapped inside little crystals. None of the products of decay were lost or gained during the course of time.
- \*Crystals formed as a result of volcanic eruptions represent a specific moment in time, and they are totally uncontaminated by any older argon. There were no products of decay already present when the rock was first formed.
- \*The crystals are able to trap all the argon that is released by potassium decay and thus can be utilized for accurate dating.
- \*None of the original radioactive material has been leached out at any period (8).

Some of the requirements and procedures for dating are noted by Johanson (9):

- \*Volcanic rocks are eminently suitable for K/Ar dating. The argon in the air adhering to the sample must be subtracted from the argon in the sample since the best vacuum pumps cannot remove all the air from the sample.
- \*The samples must be clean; that is, free of contamination from other materials and free from any damage that might have released some of the argon, such as weathering.
- \*The geologic history of the sample must be known since exposure to high temperatures causes argon to leak from the sample.

#### TYPICAL K/Ar STATEMENTS IN THE MEDIA

The following represent beliefs of scientists regarding the merit of K/Ar dating and radiometric dating in general:

In the 19th century the geologic column could be put into relative order. Then 20th century geochronologists provided new absolute dates which are in striking agreement with the previously established order of geologic ages (10). Some error is acknowledged in radiometric methods. McIntyre, for example, stated that, in general, the interlaboratory checks agree within 5 percent (11). Thus a K/Ar date of 3 million years might be off by as much as 150,000 years, which in terms of the standard geologic column would make little difference.

Curtis (12) gives his assessment of the K/Ar dating system that it is in the almost unique position in dating geologic events with high precision in the range of 50,000 to 50,000,000 years, and that K/Ar is the only method proven to have the resolving powers of accurately distinguishing intervals of a few tens of thousands of years during the past million years, and intervals of a few hundred thousand years during the past 50 million years.

K/Ar dating has been especially inviting to those studying the human fossil record. Based on K/Ar dating, Johanson (13) proclaimed that now he knew that hominids walked erect at 3

million years, before their brains had begun to enlarge. The perfection of the K/Ar methods allows the determination of radiometric ages on rocks as young as 5,000 to 30,000 years, which satisfactorily overlaps the range of radiocarbon dating. Thus K/Ar allows the dating of the entire time-scale of the evolution of man (14). Similarly, Sherratt (15) stated that although not all volcanic rocks are suitable for dating, K/Ar dates for beds above and below the important fossil hominid (man) sites in East Africa, such as Olduvai, have provided the main framework for the absolute dating of early man and his hominoid (man-like) precursors.

Archaeology magazine illustrated the reputation of K/Ar dating in this way (16), that in the overall study of the Afar fossils (such as Lucy), the fact that they have been securely dated by radiometric means is of paramount significance; for example, Lucy was between 3.7 and 2.9 million years.

#### CREATIONIST VIEWS ABOUT K/Ar AND RESPONSES FROM EVOLUTIONISTS

De Young (17) commented on the belief of scientists that the age of the moon is thought to be very similar to that of the earth. Hence lunar examples were expected to correlate closely with earth samples. Lunar sample dates, however, ranged from 2 million to 28 billion years, an outcome seldom commented on in the literature. De Young also pointed out that much of the data on half-lives has been shown to be untrustworthy, and that researchers are reluctant to report dates that differ markedly from the conventional; for example, the assumed 4.5 or 4.6 billion year age of the earth.

Many creationists and others have pointed out the results of dating Hawaiian lava flows known to be less than 200 years old dated by the K/Ar method at up to 3 billion years (18). In another example from Mexico, radical discrepancies were found between K/Ar dating and two other methods. Preclassical Mayan artifacts several thousand years old were found under strata dated by biostratigraphic methods at 50,000 years but which gave a K/Ar date of 500,000 years (19).

Bowden (20) raises these questions about the validity of K/Ar dating: Potassium can be leached out of rock as in granite to a significant degree, and it is known that argon will migrate from areas of high pressure to those of lower pressure and from lower rocks to higher ones.

Woodmorappe, who in 1979 cited 300 examples of serious discrepancies in radiometric dates that is, the dates were off by one or more geologic periods (21), concluded in 1975 (22) that "radiometric dating remains a mockery of scientific experimental technique because of its selective acceptance of results, multiplied assumptions coupled with gargantuan special pleading, rationalization of discrepant results, and ad hoc use of data."

It hardly seems necessary to add that language has been sharp on both sides of the issue. In response to such kinds of criticism, Alexander (23) retorted that "K/Ar chronologists are not fools, knaves, nor rabid evolutionists documenting our preconceived notions. We are conscientious scientists who check and recheck our assumptions and stand ready to modify those assumptions when presented with scientific evidence that the assumptions are wrong." Hayward (24) evaluated critics of K/Ar dating in this way: that, although some creationists hint at fraud or conspiracy, geochronologists are constantly learning how to avoid errors, and the value of radiometric dating is increasing all the time. He believes that creationists misuse the obviously incorrect K/Ar dates from recent Hawaiian lava to draw the false conclusion that K/Ar dating is useless.

#### CRITIQUES OF K/Ar DATING BY SCIENTISTS

It may be argued, of course, that creationists have an ax to grind in their criticism of K/Ar dating, and so it is important to examine critiques by scientists who clearly have no association or sympathy with creationism.

K/Ar dates from meteorites played a crucial role in dating the presently accepted age of the earth, yet Stokes (25), author of a current standard geology text, observed that the accuracy of the K/Ar method is upset at temperatures between 50 - 200 degrees C, depending on the type of rock. Heat upsets the closed chemical system chiefly by driving off the accumulated argon. (Meteorites become much hotter than 200 degrees C when they traverse the earth's atmosphere, yet such clearly invalid samples have played a crucial role in supposedly dating the age of the earth.)

Physicist Earl Milton (26) reviewed the radioactive decay method and concluded that the heart of the problem is the fact that all of the equations describing the decay process with respect to time involve a good deal of 'fudging around'. There are too many unknowns. These facts, together with the other assumptions required, virtually lead to the conclusion that it is necessary to assume the age of the earth in order to calculate it!

McIntyre (27) observed that many geologists know next to nothing of radiometric dating but are ready to accept without question any suitable age correlation made by such methods by their colleagues. McIntyre also pressed for more precision in reporting the dating of samples and for information on whether or not additional determinations of the sample had been made. Speaking of commonly known abuses by the scientific community, he said that dates must not be discarded on the basis that they do not fit expectations. If a rock was found acceptable for dating before it was tested, it must not then be rejected afterwards because of an unacceptable age.

A difficulty in dating older rocks is identified in Schaeffer (28). In nature, rocks and minerals usually lose some and frequently much of the radiogenic argon generated within them since they were formed. In some cases, these losses may not be related to any otherwise identifiable geological cause. As a consequence of mountain building, minerals from Precambrian rocks are found which give Cretaceous ages, hundreds of millions of years too young, presumably. A fellow scientist, Armstrong, drew the interesting conclusion that in spite of the increasing numbers of K/Ar dates published, they will never be as important for dating geologic events as fossil age determinations and physical stratigraphy.

The scholarly work edited by Schaeffer (29) contains many discrepant dates from K/Ar dating and attempts to explain them in terms of contamination, error, or unknown factors. Another similar work edited by Harper (30) is filled with problems and anomalies of radiometric dating, including much material on K/Ar dating problems. In this book two geochronologists made a strong recommendation that a committee of geologists and geochronologists be appointed with the responsibility of evaluating the reliability and meaningfulness of all radiometric dates claiming to establish the age of stratigraphic horizons. No date should be considered for publication in stratigraphic discussions if it had not survived such scrutiny. In other words, the committee would censor any inappropriate dates. The alternative, they warned, would be that the entire field of radiometric dating might come into disrepute.

A curious debate centers around Australian tektites, meteor-like stones showered on the earth supposedly from the moon. Both K/Ar and another method give dates of 700,000 to 860,000 years ago for the formation of these tektites, but geologists find the stone clusters undisturbed on the top of young sediments and declare they could not be older than 7,000 to 20,000 years. Each side attacks the method of the other (31). It is of interest to note that the legends of the ancients who revered tektites as magical stones insist that they had fallen from the sky and that they were eyewitnesses of such falls (32).

Undoubtedly the most intensive effort ever made to obtain a good K/Ar date for a fossil is described in Bones of Contention. Here Lewin (33) discussed K/Ar dating problems from his perspective as editor of Science and former editor of New Scientist in London, both prestigious scientific journals. State of the art K/Ar dating tests were to be performed by Miller at Cambridge University and his associate Fitch on KBS tuff in order to date one of Leakey's important fossils, Skull 1470. (Regarding the KBS tuff, KB are the initials of the student working with Leakey, and S stands for site or the location of the volcanic material called tuff found in direct relationship to the fossil.) Two samples were collected and the date derived was well beyond 200 million years, completely unacceptable. Two more samples were sent and a date of 2.4 million years was determined. Miller recommended refinements and then obtained 2.61 million years, a date that delighted Leakey. But since the date was criticized by other authorities, further testing was done. In 41 trials on KBS tuff the K/Ar dates ranged from 910,000 to 223 million years. One critic, Cooke, showed that KBS tuff should be dated to about 2 million years based on his pig studies which assumed a gradual increase in molar length over evolutionary time and thus the molars served as a kind of geological clock. Other dating methods were tried but the controversy continued. Fitch and Miller concluded in 1975 that further K/Ar testing of the KBS tuff would be futile. Curtis, who had obtained dates of 1.6 and 1.8 million years for the same KBS tuff, suggested that Fitch and Miller got their 2.61 million year date by reaching into a hat filled with all the numbers they had obtained, while Fitch accused Curtis of using simple conventional irrelevant K/Ar methods that were too inaccurate and old-fashioned to be acceptable and added that accurate dates certainly

would not be obtained by primitive analyses undertaken on a few samples of doubtful location by geochronologists who had not visited and studied the field locations. Fitch and Miller now claim that Leakey must have mistakenly collected samples from many sites other than the KBS tuff. Leakey called this charge most extraordinary since he was as sure of where his first sample was collected from as he was about where his home was.

#### A TIME TO DRAW CONCLUSIONS

Much of the media today still report K/Ar dates as though there are no problems of sufficient weight to make note of, but other sources draw very different conclusions about the merits of the method. We report a variety of views for the reader to weigh against those who believe there is no serious problem with the method.

Moorbath of Oxford University (34) pointed out that the analytic precision associated with determining a K/Ar date is no guarantee of its validity in terms of geological processes, to which Evernden and Evernden added that proof of reproducibility is not proof of accuracy. Speaking of the misuse of radiometric dating by archaeologists and other scientists, Hall, Director of the Research Laboratory for Archaeology of Oxford University, observed that these "quasi-scientists" take cautious laboratory reports, backed up by incomprehensible tables of data, and give them a spurious infallibility for the layman and colleagues alike. They believe because they want to believe (35).

de Grazia (36) cites Cook's conclusion about K/Ar dating, that one must handle such dating, consistent with all the facts dealing with it, by simply dismissing it as unscientific and completely unreliable, indeed absurd. The practitioners of this method simply don't publish the sort of facts they know about that would kill K/Ar dating once and for all if they were known. de Grazia's own conclusion is that the K/Ar test claims validity over a billion years and below 100,000 years. Unfortunately for its validity, and despite the brilliant technical theory, the test suffers from a defect common to radioactive elements in nature. The elements migrate, thus giving illusory ages, since rocks can both acquire and lose both elements or either alone.

In her "bible" of field archaeology, Joukowsky (37), perhaps without realizing it, gives this evaluation of radiometric dating (in this case C14):

Even though enormous advances have been made in scientific methods of dating over the past few years, archaeologists must use such dates with caution, remembering that they still contain a significant margin of error, and accepting only those that seem reasonable in relation to other archaeological information such as the previously accepted dating of a culture.

This hardly relates to a five percent error. And perhaps a fitting epitaph appropriate for K/Ar dating is unwittingly provided by Johanson for some (38): "I know anthropologists and geologists who will cling to a point long after it has become overwhelmingly clear that they are wrong."

And so we come to the same question with which we began: Are there two K/Ar dating systems? Depending upon which source one reads, K/Ar is a valid and reliable method of dating which may be applied accurately to the age of the universe itself as well as very recent times; or it is a method full of problems, glaring inconsistencies, and obviously erroneous results. Regardless of which position the reader chooses to take, it seems very fair for evolutionists and creationists alike to ask of a method that claims to be fully scientific that it do at least the following:

\*That the results of all K/Ar tests be reported. If there is picking and choosing acceptable dates and discarding unacceptable dates, as commonly reported, the practice should be universally condemned and stopped. The full record of K/Ar testing should be published in terms of apparent successes and failures for the evaluation of scientists and laymen alike.

\*That geochronologists using the K/Ar method clearly state whether or not this procedure can stand by itself for valid and reliable dating. If K/Ar testing can stand on its own merits, geochronologists should condemn the recommendation that a committee of experts be established to prevent the publication of unacceptable dates.

\*That if the half-life of K/Ar is known more precisely than 1.31 billion years, the correct half-life should be commonly reported in the media. The standard practice is to round the half-life to the nearest 10 million or 100 million years. If calculation of the half-life is that imprecise, then it should be publicly acknowledged that it is futile to attempt to establish any dates under 10,000,000 years.

\*That simple, standard statistical language should be used to report the standard error of measurement in K/Ar determinations. Current practice is to fail to mention error entirely or to state it so imprecisely that it cannot be understood or evaluated.

\*That the practice of ruling a sample as invalid after K/Ar testing has been done be condemned and stopped.

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