sics, Astronomy and Astrophysics Supplement Series, Monthly Notices of the Royal Astronomical Society, the Astronomical Journal, and from Nature's astronomical articles and letters. The Astronomy Acknowledgement Index (AAI) is original and does not overlap with the Science Citation Index (SCI). AAI-1991 includes 11,375 personal acknowledgements to 5605 people. (The last number probably is not exact. I have tried to take into account different combinations of first names and initials, but I cannot be sure that it has been done in all cases. On the other hand, namesakes are possible.) Acknowledgements are going to colleagues and referees, students and supervisors, telescope operators and software engineers, directors of observatories and institutes, wives and husbands, parents and friends, etc, etc. All of these people contributed their efforts to Astronomy.

Statistical studies based on SCI (Garfield, 1977, 1985, Abt, 1980, 1981, 1983, 1984a, b, 1987, Rao and Vahia, 1984, 1986, Trimble, 1986) have discovered many interesting features of the astronomical science development. A list of 22 most-cited papers from astronomy and astrophysics journals covered in the 1945–1954 SCI cumulation was published and discussed by Brush (1990). Note that citation counts are not direct

indicators of the importance of papers (see, e.g., conclusions made by Leydesdorff and Amsterdamska, 1990).

The statistical analysis of AAI can give us useful additional information and throw light upon another aspect of the scientific process in astronomy. Table 1 shows the general statistics of AAI-1991. Table 2 includes the names of the 21 most-acknowledged persons (in alphabetical order) in 1991. All of them are well-known scientists, who are working in large astronomical centres with an active scientific life. Undoubtedly, they are very communicable people. Most of the gratitudes (79 %) were expressed to them for useful discussions and comments. Other thanks (23 %) were due to providing of data, theoretical models, and computer codes.

Table 2 reflects some advantage of American scientists. However, it should be taken into account that as a rule American papers include more acknowledgements than European ones (on the average, 3.34 acknowledgements per paper in the American journals versus 2.45 in the European journals).

The true significance and importance of papers will be determined only after years or even tens of years. On the other hand, they have immediate personal influence on today's scientific life. The count of acknowledgements is an estimator (of course, more or less relative) of this influence.

Acknowledgement

References

Abt H.A., 1980, PASP 92, 249.
Abt H.A., 1981, PASP 93, 207.
Abt H.A., 1983, PASP 95, 113.
Abt H.A., 1984a, PASP 96, 563.
Abt H.A., 1984b, PASP 96, 746.
Abt H.A., 1987, PASP 99, 1329.
Brush S.G., 1990, Current Contents 30, No. 43, 7.
Garfield E., 1977, Essays of an information scientist: the awards of science and other essays, Philadelphia: ISI Press, 2, 120.
Garfield E., 1985, Essays of an information scientist: the awards of science and other essays, Philadelphia: ISI Press, 7, 152.
Leydesdorff L., Amsterdamska O., 1990, Sci. Technol. Hum. Val. 15, Nr. 3, 305.
Rao A.R., Vahia M.N., 1984, PASP 96, 661.
Rao A.R., Vahia M.N., 1986, PASP 98, 511.
Trimble V., 1986, PASP 98, 1347.

On the Life Expectancy of Astronomers

D.B. HERRMANN, Archenhold Observatory, Alt-Treptow/Berlin, Germany

It has, on occasion, been said and proven by prominent singular examples that astronomers enjoy a higher life expectancy than their "normal" compatriots. There have been several attempts to prove this thesis with the use of statistical data. One such example was M. Ebell's survey of the life spans of 233 astronomers using data from the obituaries in the Astronomical News from June 1881 till March 1919. Ebell (1) calculated an average life span of 62.6 years – without however having compared the data with that of the general population. He also published the median life span of astronomers from various countries. The impact of this assertation remains shaky however, due to the small number of representative examples used (i.e. in this case only 10 astronomical personalities surveyed) to substantiate his findings.

Conversely to Ebell, D.W. Wattenberg (2) used the relevant life span data of 253 deceased astronomers from articles in the Newcomb-Engelmann (3) as well as obituaries in the Vierteljahresschrift

der Astronomischen Gesellschaft and calculated a median life span of 68.7 years for astronomers. Whereby it was noticed by Wattenberg that there seemed to be a distinct rising life expectancy in the course of time, e.g. before 1500: 51.0 yrs.: 16th century: 61.9 yrs.; 17th century: 67.7 yrs.; 18th century: 70.7 yrs.; 19th century: 69.1 yrs. The distribution of these examples over the various time spans and centuries reduced the number of the cases studied to a considerable extent. For the period before 1500 there were only 4 cases, for the 16th and 17th centuries only 16 cases and for the 18th century only 48 persons could be used – statistically seen, rather small numbers.

I was able to also come across a compilation of astronomer's life expectancies from the estate of Johann Heinrich Mädler of Göttingen (4). The data which he used for his work The History of Astronomy, lists – without mentioning exact sources and time spans however – the ages of a total of 427 astronomers, for whom he calculated an average life

span of 67.8 years.

The impact of these assertions remains unsatisfactory because of the lack of comparison to similar data for the rest of the population. Thanks to the dynamic growth of life expectancy in the industrialized countries, especially from the middle of the 19th century, a clear definition of a period is particularly necessary, as are comparative counts within the general population for the same period under study.

In order to avoid the shortcomings of previous studies, the following study only indicates persons described in my book The History of Astronomy (5) and it uses comparative information about the general population (limited however exclusively to Germany) which was deduced from original source material with the greatest care (6).

Since I had access only to data about the general population for the period between 1740–1859, I limited my data to 170 astronomical personalities born between 1715 and 1825, from whom I again selected 67 who began their
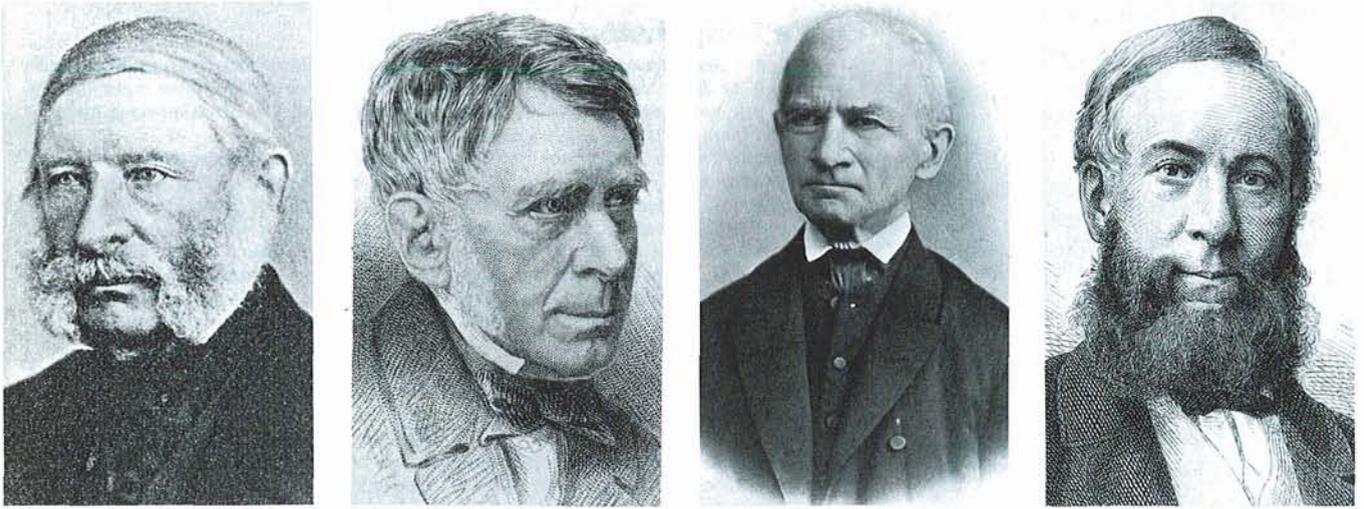
Four record holders of life expectancy of recent astronomical history – impressive but not typical. From left to right: J. J. Baeyer (1794–1885, 90.8 years); G. B. Airy (1801–1892, 90.4 years); J. G. Galle (1812–1910, 98.1 years); W. Huggins (1824–1910, 86.3 years).

careers at the age of 25 years. I calculated for them an average life span of 71.6 years. Comparative data for the general population (according to Imhof (6), page 462) indicate a life span of 60.74 years for 25-year-old males. In other words, astronomers seem to reach noticeably higher ages. Even if the criteria for the choice of data are sharpened and only German astronomers are surveyed, out of 33 cases, we get an average life span for astronomers of 69.6 years.

Some Additional Notes are Needed

(1) The use of data on astronomers published in personal registers or biographies implies that only the more famous and successful astronomers are counted. It is much more difficult to say something about all astronomers since the data of the less successful ones are not published anywhere.

(2) The difference in the corresponding life spans and life styles between social stratas of society and indeed between that of astronomers and the rest of the population was surely more pronounced in earlier centuries than it is today. Present-day astronomers are more or less integrated into the community of stress-plagued normal citizens. Thus they probably have the same high life expectancy (FRG 1984/86; 71.5 years for males; 78.1 for females) rates as in other developed countries such as the USA, Australia and other European states (7).

(3) The apparently special role played by astronomers in earlier times is relative. Life expectancies then showed constant high rates of dispersion and social criteria were very decisive factors. Even if the general life expectancy remained on a low level, surely there were

other professions and social groups (apart from astronomers) whose life cycles remained generally higher than that of the average person.

100 years ago an astronomer could count on becoming fairly old, but today it is perhaps not quite as worthwhile to choose this arduous profession just to attain this goal. Still, there are exceptions which confirm the rule.

(Translated by R. Guha)

References

1. M. Ebell, Die Lebensdauer der Astronomen. In: *Sirius* **52** (1919), 213–214. I am greatful to D. Fürst for drawing my attention to this source.
2. D. Wattenberg, Das Lebensalter der Astronomen. In: *Die Himmelswelt* **55** (1948), 68–69.
3. Newcomb-Engelmann, *Populäre Astronomie*. 7th edition, Leipzig 1921, p. 801–818.
4. Estate of J.H. Mädler. Niedersächsische Staats- und Universitätsbibliothek Göttingen.
5. D.B. Herrmann, *History of Astronomy from Herschel to Hertzsprung*. Cambridge/England 1984.
6. A.E. Imhof, *Lebenserwartungen in Deutschland vom 17. bis 19. Jahrhundert*, Weinheim 1990.
7. *Ibid*, p. 28.

Pluto and Charon

This drawing of Pluto and Charon was made by Hermann-Michael Hahn, science journalist and physicist in Cologne, Germany, on the basis of the description of the system in the December 1991 issue of the Messenger.

It shows the smaller Charon to the right behind Pluto, exiting the planet's shadow. The brighter area near Pluto's south pole is to the left and the darker north pole to the right.