



Note paper follows?

A member of the physics department at the University of Surrey, Dr John Bowsher, must be working on one of the most unusual projects to be sponsored by the Science Research Council. He is to bring the scientific method to bear on the burning problem of why really good trombones sound the way they do. All trombones, it would seem, do not sound the same even though they may look indistinguishable, and it is generally the skill of a craftsman who knows just where to change the shape of a given instrument slightly

that saves many new instruments from the ignominy of being $\beta+$ rather than α .

With the music company Boosey and Hawkes, who produce 300 trombones a week, relying on the skill of just one craftsman in his 50s to suggest a little judicious adjustment in such and such a place, Dr Bowsher seems almost to be working against the clock in his analysis of the 'transient qualities' of trombone notes—namely what goes on in the first and last few milliseconds. Fortunately Dr Bowsher and one of his research students are actually trombone players themselves. □

correspondence

Czech conditions

SIR.—The discussion in *Nature* on the plight of the Czechoslovak scientists and my participation in it has had very unexpected and grave consequence for me personally.

A few days ago I learnt of a decision of the Czech Ministry of Inner Affairs, according to which I have been stripped of my Czech citizenship. The motivations for such an extraordinary decision are given as follows:

(1) The lecture about human rights I gave at the annual meeting of the German section of Amnesty International in June 1974 in Duisburg. (2) My letter to *Nature* (September 20, 1974), which, I have now learnt, had been broadcast in Czech by Rado Free Europe.

Needless to say, I protest strongly against this decision, which I consider unlawful and contradicting the Universal Declaration of Human Rights as well as other generally valid and accepted declaration and principles.

After being unemployed for more than three years because of my public activity and statements I was allowed to leave Czechoslovakia temporarily in December 1973. When leaving my country I submitted letters to the President of the Czechoslovak Academy of Sciences and to the Ministry of Education, informing them that I was leaving only because I could not find a proper job there, that I would be working abroad as a Czechoslovak scientist and citizen, and that I wished to return home as soon as a job was offered to me.

The decision of the Prague authorities provides another strong argument against the opinion that things are being normalized in Czechoslovakia; it shows what is the real situation and the con-

ditions Czechoslovak intellectuals have to live in.

Yours faithfully,

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Citation analysis

SIR.—Concluding their recent letter (March 13), Pragier and Ronayne, citing Langrish, state "...our results raise serious doubts as to the validity of citation analysis in the determination of the relationship between science and technology."

I suggest that these conclusions have been reached because of a misconception about the scope of citation analysis, and do not, in fact, cast doubts on validity.

Langrish examined citations from articles by British industrial chemists, finding that they were largely of non-university origin, whereas Pragier and Ronayne studied citations from biologically oriented articles in *Reports on the progress of applied chemistry*, finding them to be mainly of university origin.

From this it may be concluded, as Pragier and Ronayne state, that information was drawn from different sources by these two communities, but this does not mean that such studies are not of value for studying the background of university and industrial science and technology.

What it does mean is that such studies are likely to be most useful when applied to a community whose members are characterised by having an interest in a specific aspect of science.

If the same pairs, triples, quads . . . , of references are observed in a number of articles, there is an implied consensus of opinion—the authors are perceiving a relationship between the earlier cited

articles. The heavily co-cited articles form the putative 'core' literature of the subject. This technique, originated by H. Small, was used to study the literature generated by the scientific community engaged in amorphous (chalcogenide glass) semi-conductor research from 1968 to 1973. Until 1972 the core articles, with one exception, came from universities.

In 1972 the core was augmented by articles from non-university sources. The cause of this was heavy co-citing of 1972 articles by 1973 authors. These authors often used title words indicating that device applications were described in their articles. It may be concluded that during this period materials, hitherto of research interest, started to



A hundred years ago

Dingler's Polytech. Journal contains an account of researches made by Dr Otto Krause, of Annaberg, on tobacco smoke, which he finds contains constantly a considerable quantity of carbonic oxide. The after effects of smoking are said to be principally caused by this poisonous gas, as the smoker never can prevent a part of the smoke from descending to the lungs, and thus the poisoning is unavoidable. The author is of opinion that the after effects are all the more energetic, the more inexperienced the smoker is, and he thus explains the unpleasant results of the first attempts at smoking, which are generally ascribed to nicotine alone. from *Nature*, 11, 456; April 8, 1875

be used in devices having practical applications.

Articles identified in this way may be depicted as interconnected elements on a citation map. Replotting of the maps periodically enables the growth, decay and changing interrelationships of specialities to be studied. It seems likely that this will provide an overview of the ramifications of science for the benefit of science policy makers and others.

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Great Plains weather

Sir,—A number of authors have pointed out the periodicity or quasi-periodicity of 20 to 22 years in the recurrence of droughts in the Great Plains of North America, the region between the Rocky Mountains and the Mississippi River. Perhaps most notable of these droughts was the "Dust Bowl" era in the 1930s which retarded the Great Plains agriculture and economy for a full decade. Most authors have also pointed out that the mid-years of the droughts coincide fairly well with every other sunspot minimum, specifically the minimum in which the polarity of the leading spots in the Sun's northern hemisphere is changing from north-seeking to south-seeking.

Since we are now approaching another solar minimum of the type mentioned, the question of the reality of the sunspot drought relationship is of great interest. The dates of the four most recent solar minima of this kind, and the central year of the four most widespread droughts in the Great Plains, were as follows:

| Sunspot minima | Mid-years of droughts |
|----------------|-----------------------|
| 1889 | 1892 |
| 1912 | 1912 |
| 1933 | 1934 |
| 1954 | 1953 |

The causes of these droughts are not well understood. J. R. Borchert has pointed out that some of these in the table were associated with greater than normal zonal circulation of the atmosphere, and some with increased meridional flow, evaluated on a hemispheric basis. The common element in drought situations seems to be stability in the type of weather pattern, that is, drought tends to be associated with a highly persistent pattern, either meridional or zonal.

I. R. Tannehill points out that drought in the Great Plains is associated with higher than normal pressure in the eastern Pacific area, whereas others find that droughts in western Kansas tend to occur simultaneously with positive height anomalies at 700 millibars over the eastern Pacific between latitudes 30° and 40° N and with negative surface temperature anomalies

over the eastern tropical Pacific.

In the spring and summer of 1974 there was evidence for the beginning of another drought in the Great Plains. If the situation is the same in most of the next several years, we may well conclude that the periodicity of 20 to 22 years is recurring. A sunspot minimum of the type mentioned; is expected in, perhaps, 1976.

In the spring the drought was confined to the western and southern parts of the Great Plains (Fig. 1). Most of the Great Plains region was actually suffering from too much rainfall, with serious delays to the starting of the spring planting in large areas. Meteorologically, the region was affected by greater than normal westerly wind flow. Thus the drought in the area just east of the Rockies may perhaps best be described as primarily a rain-shadow effect.

By mid-June and extending through July (Fig. 2), the situation had changed to a more meridional flow, with a stable high pressure cell over the Mississippi Valley in the upper atmosphere. This created an extended period of low precipitation and abnormally high surface temperatures just at the time when

certain crops, such as corn and soy beans, were reaching the maturing stage. For instance, Grand Island, in central Nebraska, reported no precipitation from June 15 until July 22, the longest rain-free period ever recorded at that station. The resulting damage to crops in such states as Iowa, Kansas, Nebraska, Oklahoma and adjoining states approached \$10,000 million dollars. This loss was caused mainly to the extreme but short summer drought, but also in part by the spring drought in western Oklahoma and northern Texas.

A mere coincidence in timing between the droughts and the double sunspot cycle will not, of course, constitute proof of a physical relationship. If, however, the drought of the 1970s does materialise, over the next several years, we will have a very strong incentive to search for physical mechanisms to explain the linkage or to provide other reasons for the recurrence.

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Based on information from National Weather Service, NOAA

