# "METEOROLOGICAL MAGAZINE"

May-June, 1941.

For various reasons it was not possible to prepare a typescript Magazine for May and the issues for May and June are therefore combined.

Short contributions for future issues will be welcomed.

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## THE COLD PERIOD DECEMBER 1940 TO MAY 1941.

The following notes on the long cold period may be of interest. (The period examined for comparison is 1901-1941).

(1) May 1941(49.6°F) was the coldest May over England and Wales during the period 1901-1941 apart from those of 1902(48.6°F) and 1923(49.5°F). The figures in brackets refer to mean temperature at sea level.
(2) January to May 1941 was colder than any similar period over England and Wales, apart from that of 1917
(3) December 1940 to May 1941 was colder than any similar period over England and Wales apart from December 1916 to May 1917.
(4) In 1917, May was warm and in 1902 and 1923 the periods before May were not remarkably cold.

December 1940 to May 1941 is outstanding therefore as a long cold period extending into May. Sunshine was less than usual especially over England and Wales. Rainfall statistics are not remarkable although the fall was generally deficient over Scotland during the period.

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J.G.

## BLACK RAIN IN EDINBURGH.

During the afternoon of Monday, April 21st, a shower of black rain was reported in the southern suburbs of Edinburgh. Windows were dirtied by the precipitation, clothing - especially light coloured clothing - was badly marked and washing spread out to dry was spoiled by muddy splashes.

The explanation of the phenomenon lies in the unusual atmospheric conditions prevailing at the time, for the details of which I am indebted to Mr.W.J.Grassick of Abbotsinch. A weak westerly gradient existed over the Firth of Clyde and an easterly gradient over the Firth of Forth area. A light and relatively warm, west wind carried the soot and smoke from industrial Clydeside towards the east. A very light and cool easterly breeze blowing across the east coast kept the resulting pall of smoke or dirt suspended over the area between Glasgow and Edinburgh.

Local convection in the upper warm air appears to have caused at the same time convection of the soot and smoke in vertical columns and showers from these columns. The weather type is similar to that referred to as follows in Sir Napier Shaw's "Manual of Meteorology" Vol. II p.40: "Occasionally, in exceptional atmospheric conditions appropriate for thunderstorms, the large aggregated soot particles are carried bodily to great distances and fall as black rain".

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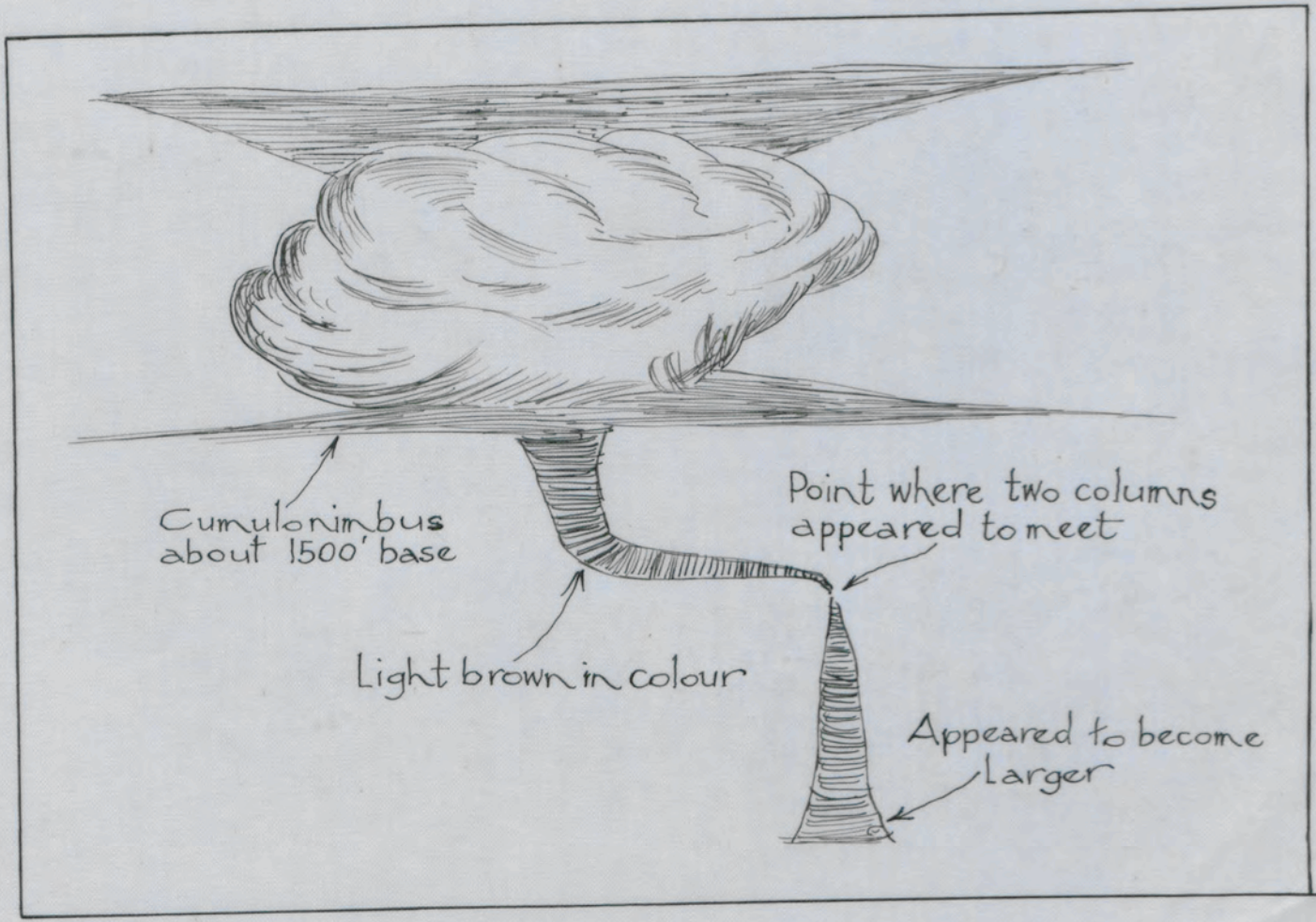
H.E.Carter.


Cumulonimbus
about 1500' base
Point where two columns
appeared to meet
Light brown in colour
Appeared to become
larger

A CLOUD-PENDANT OBSERVED FROM SEALAND, MAY 10th, 1941.

An unusual phenomenon resembling a water spout, was observed at Sealand on May 10th, 1941 at 13h50m. B.S.T.

At the time a large cumulonimbus was directly overhead, which gave a heavy shower a quarter of a mile away, although little precipitation was observed at Sealand. From the centre of the cloud appeared a column light brown in colour and very similar to that made by an aircraft plunging earthwards, on fire. This column appeared to become horizontal after two or three hundred feet and then to proceed in the horizontal plane for a short distance. At the same time a column appeared to rise from the ground at a point about one mile east of Sealand, gradually becoming thinner and meeting the other column at a point where it again beccame vertical.

The phenomenon lasted about three minutes, and was observed by many people on the camp.

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Meteorological Office,
Sealand.

G. Locke.
May 12th, 1941.

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Mr. J. Durward who forwarded this report remarks:

"A somewhat similar phenomenon was described by me in the Magazine for 1937 (p.235) but in this case the columns were sand"

It is possible that, in this case, the ascending column was a dust or sand whirl since it appeared to rise from a point where there is no appreciable body of water.

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LUNAR HALO PHENOMENA OBSERVED AT BOSCOMBE DOWN, APRIL 10th-11th, 1941.

During observations for the 2200 G.M.T. synoptic report, cirro-stratus in polar bands was noted, giving a complete lunar halo ($22^{\circ}$ radius) and, in the north-western sky, an intensely luminous arc with a complete paraselena at its mid point and an incomplete disc at its southernmost end. The positions of these phenomena were at once measured.

A varied display of halo and mock-moons, with paraselenic horizontal circle, and an arc of contact, continued through the next three hours as the bands of cirro-stratus moved across the sky. Wherever possible measurements were taken of these intermittent phenomena but, as the observer on duty was alone in the office, observations were necessarily interrupted and some phenomena appeared and faded before it was possible to go up to the theodolite platform to take readings. (The presence of enemy aircraft aggravated these conditions.) In such cases the phenomena were located by estimation but were placed on record only if they recurred and if further observations of them confirmed the first.

The accompanying diagram summarizes the phenomena observed and a detailed sketch is given of the appearance of the halo when an arc of contact formed at about 2400 G.M.T. This arc was elliptical and its curve cut the horizontal circle, it is estimated, at about $30^{\circ}$ from the moon.

A broad band of condensation trails formed by enemy aircraft flying from south to north was seen apparently to exhibit halo formation as it moved across the sky into a position tangential to the horizontal circle: an arc of the circle appeared on the trails at about $90^{\circ}$ east of the moon.

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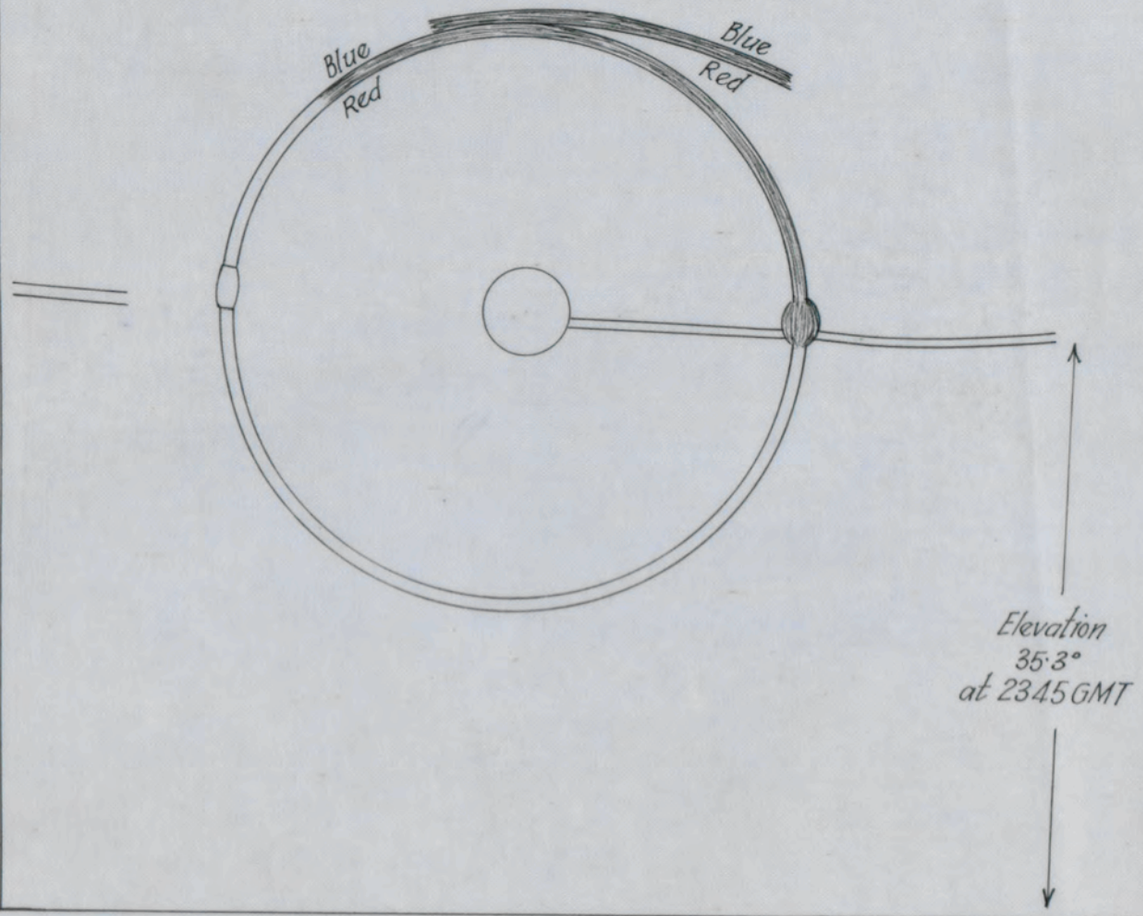
## Appearance at 2400 GMT

Thickened band of Cs running N-S over moon and more intense on W half gave complete circular halo, arc of contact, and paraselinae of 1st halo (22°) as shown, and at 122°W and 180°; and a further band of Cs to E gave additional arc of horizontal ring and paraselina at 90°E.




## Summary diagram of all phenomena observed.

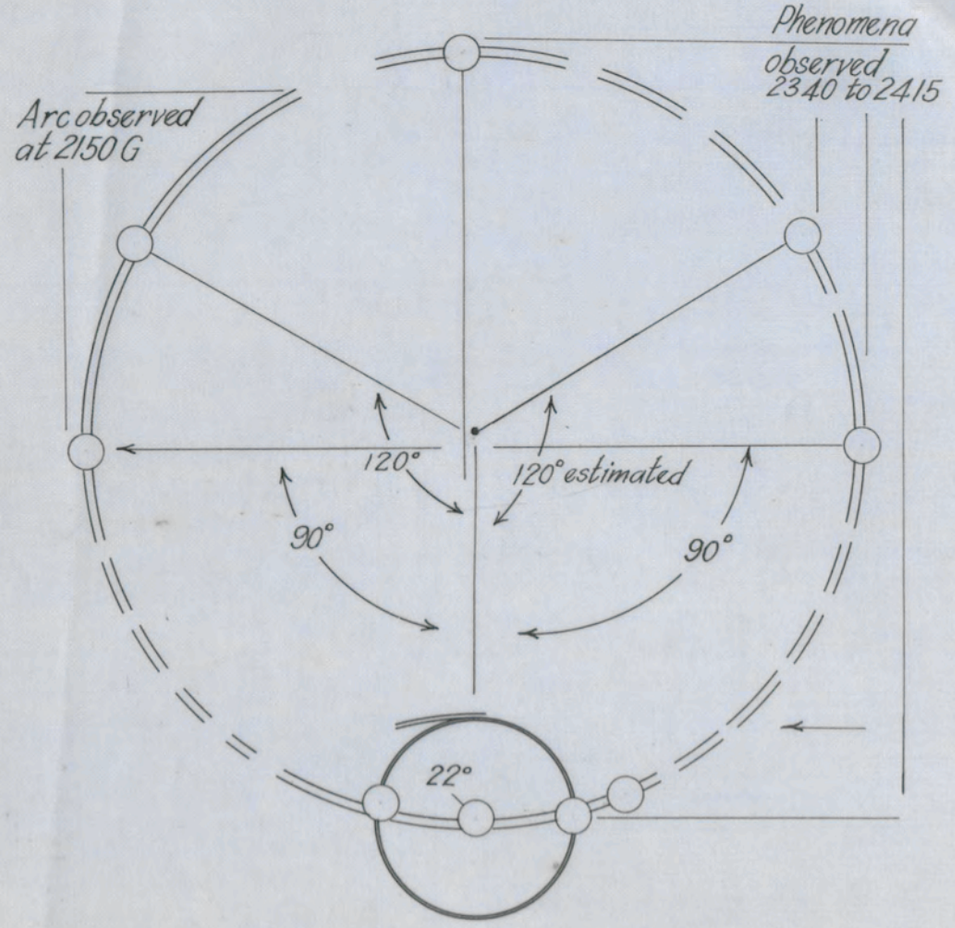


TABLE OF PHENOMENA, AND MEASUREMENTS.

| Approx. time G.M.T | Position of moon. Bearing from N. | Elev. | Phenomena observed; remarks. | Position of phenomenon Bearing from N. | Bearing from moon. | Elev |
|---|---|---|---|---|---|---|
| 2150 | 154.8 | 33.3 | 1. Complete halo, radius 22 deg... | | - | |
| | | | 2. Arc of horizontal circle ..... | 244/331 | | 33.3 |
| | | | 3. Paraselena, complete, very luminous ... | 276.8 | W.122 | 33.3 |
| | | | 4. Paraselena incomplete ..... | 244 | W.90 | 33.3 |
| 2300 | 178.6 | 35.8 | 1. Paraselena | 299 | W.120 | 35.8 |
| | | | 2. do. | 359 | 180 | 35.8 |
| | | | 3. Paraselena of 1st halo. | 201 | W.22 | 35.8 |
| 2340 to 2415 | 188 | 35.3 | 1. Paraselena | 008 | 180 | 35.3 |
| | | | 2. do. | 098 | E.90 | 35.3 |
| | | | 3. do. | - | W.30 | 35.3 |
| | | | 4. do. | - | W.120 | 35.3 |
| | | | 5. Arc of contact; paraselena of 1st halo; horizontal circle within 1st halo. | - | - | - |
| 2430? | 200 | - | 1. Paraselena. | 170 | E.30 | - |

Most of these phenomena recurred at times when it was not possible to measure them.

## REVIEW.

Weather analysis and forecasting. A textbook on synoptic meteorology. By Sverre Petterssen. 8vo. pp. xvi + 503, illus. McGraw-Hill Publishing Co. 1940. Price 35/-.

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It is perhaps fitting that frontal methods of weather forecasting, which originated during the last war, should receive their most detailed and systematic exposition in a practical text-book during this one. In the interval however the emphasis has partly shifted from fronts to air-masses and an enormous amount of work has been done on frontal and air-mass analysis both at the surface and in the upper air. The time was ripe for this new knowledge and these new methods to be made generally available in book form.

In accordance with the new orientation, the book opens with a long chapter on "Air mass characteristics" - temperature, potential temperature and lapse-rate, various methods of defining moisture-content, clouds and hydrometeors. This chapter is introductory, defining and illustrating the terms which constantly recur in the later parts of the book. With Chapter II - "Stability and instability in relation to weather phenomena" we plunge at once into the physics of the free air. The discussion of the criteria of absolute and conditional instability is very thorough, and includes a number of examples of the use of upper air data in forecasting convectional phenomena; there is also a full account of the causes of fog formation and of the prediction of the depth and duration of fog. The most striking illustrations refer to fog in California, where the conditions appear to be more clear-cut than in Britain. This chapter of 87 pages is the longest in the book and anyone who reads it carefully will certainly acquire a very useful knowledge of a large and important section of meteorology. The third chapter is more climatological,

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dealing with the production and transformation of air masses. The northern hemisphere is mapped into regions of origin of different air masses in winter and summer, and the climatology of each type of air mass is described, again in three dimensions, with normals of temperature and humidity at different levels.

The next two chapters, "Kinematical analysis; wind and pressure" and "Kinematical analysis; frontogenesis" give the mathematical basis of modern forecasting as a study of the motion of the air, for although observations of wind made in the frictional layer close to the earth's surface are not in themselves sufficiently accurate or representative for mathematical treatment, their relationships to other elements, and especially to pressure, have proved useful in the analysis of daily weather charts. These chapters are, for the most part, rather formal but they lead up to the physical treatment of fronts and frontal characteristics and, in Chapter VII, to an interesting account of waves and cyclones in which, besides the now classical Norwegian cyclone, we have other conceptions, for example the combination of wave motion with shearing, which have not previously appeared in book form.

One of the most interesting recent developments in America has been the construction of upper air charts showing the topography of selected isentropic surfaces and the conditions of humidity and wind associated with them. These charts enable the movements of air masses to be followed from day to day more readily than do charts for fixed levels, and the chapter on isentropic analysis which is contributed by J.Namias gives some striking illustrations of their use. With this chapter we reach the end of the first mainly theoretical part of the book, and come to three chapters dealing with the practical applications. Chapter XI, "Forecasting the displacement of pressure systems, fronts and air masses", begins with a formal mathematical discussion, which introduces and explains some of Petterssen's famous rules for forecasting and ends with practical examples. The treatment of "deepening and filling" of depressions is on similar lines; both chapters illustrate in detail the use of isallobars.

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All these varied methods of analysis come to fruition in the final chapter "The technique of analysis and forecasting" which takes the reader through the whole process of interpreting and plotting the observations down to the actual wording of the forecast. Two examples are given by way of illustration, one for the North Atlantic to show the method of dealing with ocean areas where observations are scanty, and the other as an example of three-dimensional analysis over the United States.

So much for the contents; but for the guidance of readers it is also necessary to catalogue some of the omissions. The book is definitely intended to present Petterssen's own ideas on forecasting and some very important sections of European (including British) work are not represented. We may mention the British investigations on revolving fluid in the atmosphere; the work of the German meteorologists on alternative methods of constructing model cyclones, especially Exner and von Ficker; the "systemes nuageux" of the French meteorologists, and even some of the work of Bjerknes (Diagnostic and prognostic application of mountain observations) and Refsdal (Der feuchtlabile Niederschlag) - neither of the two latter important contributions to forecasting theory are even included in the bibliography. In the section on fog some reference should be made to the work of Willett and Georgii.

Nevertheless the book is a remarkable achievement, well written and abundantly illustrated by 248 maps or diagrams which add greatly to the clarity of the text. It remains only to add that the printing and binding maintain the high standard set by the publishers, who have done a great service to meteorologists in producing so complete a work at such a relatively moderate price.

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"RADIO LOCATION"

The recent broadcast on the detection of enemy aircraft was of special interest to those who knew Mr. Watson Watt when he was at the Meteorological Office, and who remembered his early experiments on atmospherics. Mr. Watson Watt was recently elected to the Fellowship of the Royal Society.

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Professor F.A. Lindemann who, in addition to his many papers on physical and astrophysical subjects, has published theories on the meteorology of the upper air was created a baron on the King's Birthday.
He has recently been acting as personal assistant to the Prime Minister.

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## OBITUARY.

Dr. Otto Pettersson who died at Gothenburg on January 16th 1941, within a month of his 93rd birthday, was well known as a physicist and oceanographer. After some early work in chemistry, he was soon attracted to the hydrography of the Baltic and of the Arctic Ocean. He became especially interested in the submerged surface of discontinuity between a lower layer of warm saline water and a surface layer of colder but less saline water. His investigations into the changes of the herring fishery led him to relate the movements of the herring to tidal oscillations in this surface of discontinuity, and so to a striking theory of climatic changes resulting from the varying tidal action of the sun and moon. In the 13th and 14th centuries this tidal force was especially active, and resulted in a series of great storms in the North Sea, forming the Zuyder Zee and causing much destruction on the coast of England. He also considered that the great climatic vicissitudes of that period were indirectly due to the same cause, which played a great part in mediæval history, even to the rise and disappearance of the Norse colonies of Greenland. Pettersson was more than a theorist however; he was ingenious both in the design and the use of instruments and has contributed greatly to our knowledge of northern waters.

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Francis Druce who recently lost his life through enemy action was well known as a botanist and a collector of books. He was also keenly interested in Meteorology, and his meteorological and botanical libraries contained many rarities. Mr. Druce served as treasurer to the Royal Meteorological Society from 1915 to 1918 and again from 1925 to 1932. He presented his collection of meteorological books to the Society some seven years ago.

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Captain Sir David Wilson Barker who died on June 15th at the age of 82 was for many years Captain-Superintendent of H.M.S. Worcester. He was an enthusiastic meteorologist and was President of the Royal Meteorological Society from 1903 to 1905 and contributed many papers to the Society.

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