ραματόζῳον παρετηρήσαμεν ἐπιπροσθέτως τὴν παρουσίαν δύο μικρῶν φυσσαλίδων, αἵτινες ἐξηφανίσθησαν μετὰ διήμερον.

Ἀντιθέτως εἰς τὰ ὑπ' ἀριθ. 6 καὶ 7 πρόβατα, ἅτινα ἐνωφθαλμίσθησαν διὰ σκαριφισμοῦ τοῦ δέρματος χωρὶς νὰ ἔχωσι προηγουμένως μολυνθῆ δι' ἄλλης ὁδοῦ, παρετηρήσαμεν τὴν ἐμφάνισιν τυπικοῦ ἐξανθήματος. Οὕτως εἰς τὸ σημεῖον σκαριφισμοῦ τὴν 2αν ἡμέραν παρετηρήθη ἐρύθημα, τὴν 3ην καὶ 4ην ἐνεφανίσθησαν πολυάριθμοι βλατίδες, αἵτινες μετετράπησαν εἰς φυσσαλίδας τὴν 5-6ην ἡμέραν, εἰς φλυκταίνας τὴν 7-8ην καὶ εἰς ἐφελκίδας τὴν 12ην. Αἱ τελευταῖαι ἀπέπεσαν τὴν 15ην-18ην ἡμέραν.

Εἰς τὰ τελευταῖα ταῦτα πειραματόζῳα (ὑπ' ἀριθ. 6 καὶ 7) μετὰ τὴν πάροδον μηνὸς ἀπὸ τῆς δερματικῆς προσβολῆς ἐγένετο ἐνοφθαλμισμὸς τοῦ κερατοειδοῦς χιτῶνος ἀμφοτέρων τῶν ὀφθαλμῶν. Παρετηρήθη ἡ ἐμφάνισις τυπικῆς κερατοεπιπεφυκίτιδος ὡς καὶ εἰς τὰ ὑπ' ἀριθ. 1, 2, 3, 4, 5 καὶ 8 πειραματόζῳα.

Οὕτως ἡ προσβολὴ τοῦ κερατοειδοῦς προστατεύει μερικῶς τοὐλάχιστον τὸ δέρμα, ἐνῷ ἀντιθέτως ἡ προσβολὴ τοῦ δέρματος οὐδεμίαν προστασίαν δημιουργεῖ διὰ τὸν κερατοειδῆ.

Ἐκ τῶν ἀποτελεσμάτων τῶν ἡμετέρων πειραμάτων προκύπτουν τὰ κάτωθι συμπεράσματα.

1) Ἡ δαμαλὶς εἰσαγομένη διὰ τοῦ κερατοειδοῦς χιτῶνος τοῦ προβάτου προκαλεῖ κερατοεπιπεφυκίτιδα ὅπως εἰς τὰ βοοειδῆ καὶ τὸν κόνικλον.

2) Ἡ προσβολὴ ἑνὸς ὀφθαλμοῦ δημιουργεῖ ἀσθενῆ προστατευτικὴν ἐνέργειαν διὰ τὸν αὐτὸν ὀφθαλμόν, οὐδεμίαν δὲ διὰ τὸν ἄλλον.

3) Ἡ διὰ δαμαλίδος κερατοεπιπεφυκῖτις δημιουργεῖ μερικὴν προστασίαν τοῦ δέρματος, ἐνῷ τὸ δερματικὸν ἐξάνθημα οὐδεμίαν ἀνοσίαν φέρει εἰς τὸν κερατοειδῆ χιτῶνα.

(Ἐκ τοῦ Κτηνιατρικοῦ Μικροβιολογικοῦ Ἰνστιτούτου Ὑπ. Γεωργίας).

ΑΣΤΡΟΜΕΤΕΩΡΟΛΟΓΙΑ. — **The mean monthly air temperatures in Prague and Berlin during the periods of solar activity,** by *Lyssimahos Mavridis**. Ἀνεκοινώθη ὑπὸ τοῦ κ. Βασιλ. Αἰγινήτου.

1. Prof. Xanthakis, in recent papers [1,3], has pointed out, that for many stations of the temperate zones, the mean monthly air temperatures

* ΛΥΣΙΜΑΧΟΣ ΜΑΥΡΙΔΗΣ: Αἱ μέσαι μηνιαῖαι θερμοκρασίαι τοῦ ἀέρος εἰς Πράγαν καὶ Βερολῖνον κατὰ τὰς περιόδους τῆς ἡλιακῆς δράσεως.

in absolute degrees T_i, $i = 1,2, \ldots 12$, verify the following relations:

$$(1) \qquad T_{\mu,i} = \frac{1}{2}\left(T_i + T_{13-i}\right) = A + C \sin (L_i - V)$$

$$(2) \qquad R_i = \frac{T_{13-i}}{T_i} = \frac{p}{1 - e \cos (L_i - w)}$$

$$i = 1,2, \ldots 6$$

where L_i, $i = 1,2 \ldots 6$, is the longitude of the Sun at the middle of the months January, ... June, for the middle year of the time interval considered, and A, C, V, p, e, w, are constants to be determined.

A theoretical justification of these relations, is given by Xanthakis, for the case in which we consider the Earth without atmosphere [2,3].

Using relations (1) and (2), Xanthakis gives a new mathematical expression of the annual variation of the air temperature, in the temperate zones. i. e.:

$$(3) \qquad T_i = \frac{2p}{p+1}\left[A + C \sin (L_i - V)\right] \cdot$$
$$\cdot \left[\frac{1}{p} - \frac{e}{p+1} \cos (L_i - w) - \frac{e^2}{(p+1)^2} \cos^2 (L_i - w)\right]$$

$$(4) \qquad T_{13-i} = \frac{2p}{p+1}\left[A + C \sin (L_i - V)\right] \cdot$$
$$\cdot \left[1 + \frac{e}{p+1} \cos (L_i - w) + \frac{e^2}{(p+1)^2} \cos^2 (L_i - w)\right]$$

$$i = 1, \ldots 6$$

This new expression, is of a special interest, because the majority of the constants appearing in them, are related, as Xanthakis has shown, to certain quantities characteristic of the annual variation of the air temperature.

Thus, if we denote by T_h, T_c the mean temperatures of the 4 warmer and the 4 colder months of the year, by T_{eq}, T'_{eq} the mean temperatures during the months of the equinoxes, and by T_s, T_w the mean temperatures during the months of the solstices, i. e.:

$$T_h = \frac{1}{4}\left(T_5 + T_6 + T_7 + T_8\right), \qquad T_c = \frac{1}{4}\left(T_{11} + T_{12} + T_1 + T_2\right)$$

$$T_{eq} = \frac{1}{2}\left(T_3 + T_4\right), \qquad T'_{eq} = \frac{1}{2}\left(T_9 + T_{10}\right)$$

$$T_s = \frac{1}{2}\left(T_6 + T_7\right), \qquad T_w = \frac{1}{2}\left(T_{12} + T_1\right)$$

then we have the following relations, given by Xanthakis:

(5) $$T_h - T_c = 1.673\ C \cos(V - 9^\circ)$$

(6) $$T'_{eq} - T_{eq} = (P_o + ee_o) + e_o \cos(w - 9^\circ)$$

(7) $$\mathrm{tg}(V - 9^\circ) = \frac{2}{1 + \sqrt{3}} \cdot \frac{(T_s + T_w) - (T_{eq} + T'_{eq})}{(T_4 - T_3) + (T_9 - T_{10})}$$

where:

$$P_o = (p - 1)\, T_{eq}, \qquad e_o = ep\, T_{eq} \cos 15^\circ$$

By using relations (5), (6), (7), the study of the variations of the «seasonal temperatures», is transfered to the study of the variations of the constants in relations (1), (2).

Prof. Xanthakis, referring to the above in his paper [3], after showing that relations (5), (6), (7) are satisfactorily verified by the observations in 6 stations of the northern temperate zone, studied, by using these relations, the variations of the seasonal temperatures, in those stations, from period to period of solar activity.

For the determination of the values of the constants p, e, w, he used a method of successive approximations [1], while for the constants A, C, V, he made use of another method [3].

In this paper, we extend the relative research to two more stations, of the Central Europe, having a long series of thermometrical observations i. e. Prague [4, 5] and Berlin [6].

We have found, that relations (1) and (2), are satisfactorily verified for these stations too. Thus, in Table I, the calculated values of the constants

TABLE I

Values of the Constants

PERIODS	PRAGUE						BERLIN						L_1
	A	C	V	p	e	w	A	C	V	p	e	w	
1776—84	281.81	10.47	6.0°	1.00562	0.01380	11.3°	282.08	10.47	9.8°	1.00457	0.01542	9.1°	296° 25′
1785—98	283.14	10.22	10.9	0.99735	2367	13.3	282.24	10.08	12.0	0.99520	2617	17.7	296 31
1799—1810	282.40	10.62	6.9	1.00193	2283	9.4	280 68	10.17	5 5	1.00340	2085	12.0	295 37
1811—23	281.89	10.34	2.5	1.00015	1873	7.0	280.53	10.03	1.6	1.00006	1913	7.6	295 41
1824—33	282.41	10.54	7.5	1.00906	1232	—10.9	281.46	10.05	6.8	1.00645	1333	—11.2	295 47
1834—43	282.19	10.31	10.5	0.99946	2499	8.4	281.93	9.59	11.4	1.00021	2185	9.2	295 50
1814—56	281.63	10.10	9.6	0.99635	2649	10.5	281.77	9.65	12.4	0.99676	2630	10.8	295 57
1857—67	281.62	10.20	5.9	0.99797	2391	15.2	282.19	9.46	10.8	0.99573	2680	13.8	296 3
1868—78	282.30	10.35	10.6	0.99942	2226	20.8	282.84	9.33	13.8	0.99828	2298	21.3	296 8
1879—89	282.00	10.03	10.9	0.99982	2110	11.4	282.41	9.43	15.5	0.99934	2243	9.9	296 12
1890—1901	281.65	10.03	7.1	1.00124	1972	11.1	281.99	9.55	8.8	1.00080	1924	13.0	296 17
1902—13	282.53	9.42	12.2	1.00007	1688	13.6	282.87	8.94	14.6	0.99770	2000	12.6	295 21
1914—23	282.88	9.40	14.4	1.00022	1674	17.9	282.73	8.98	13.5	1.00033	1558	20.5	295 27
1924—33	282.24	9.81	10.6	0.99824	2501	13.1	282.46	9.18	12.0	0.99950	2271	15.7	295 32
1934—44	282.19	10.06	6.8	1.00089	2113	11.0							295 36

A, C, V, p, e, w, for the successive periods of solar activity are given. Each period begins during the year following that, in which the minimum of the mean annual relative sunspot number occurs. Using these values we easily find the values $(T_{\mu,i})_{cal.}$, $(R_i)_{cal.}$ of the quantities $T_{\mu,i}$ and R_i, given by relations (1) and (2), and we see, that the 92 per cent of the differences $(T_{\mu,i})_{obs.} - (T_{\mu,i})_{cal.}$ are less than, or equal to, $\pm 0^\circ.5$ C; also that 75 per cent of the differences $(R_i)_{obs.} - (R_i)_{cal.}$ are less than, or equal to, $\pm 20.10^{-4}$.

For the determination of the values of the constants, we made use of the method of the least squares. For this purpose, we modified at first the used values of the longitude of the Sun. Thus, as L_i was taken the quantity $L_i = L_1 + y_i$, $i = 1, 2, .. 6$, where L_1 has for each period of solar activity the values given in the last column of the Table I, while the values of y_i for each century 18th, 19th, 20th are given in Table II. The method of calculation of these values of L_i, and the detailed description of the method used for the determination of the constants, are given in another paper of ours, to be shortly published [7]. We notice here that the use of this new method does not, as a whole, change appreciably the values of the other constants, except the two phase angles w and v, whose values are increased by 2° approximately, owing to the use of the new values of L_i.

TABLE II

Values of y_i

Centuries	y_1	y_2	y_3	y_4	y_5	y_6
18th	0° 0′	30° 3′	59° 42′	89° 44′	119° 17′	148° 30′
19th	0° 0′	30° 3	59° 44′	89° 48′	119° 23′	148° 36′
20th	0° 0′	30° 4′	59° 47′	89° 53′	119° 29′	148° 43′

2. Variations of the constants.

Figures (I), (2), (3) and (4), give the graphs of the C, e, w, V, respectively, for the successive periods of solar activity, for Prague and Berlin and also for Vienna, which has been studied by Xanthakis [1].

1. The values of the constants for Vienna, found by Xanthakis [3], are shown in fig. (1), (2), (3) and (4), by broken lines, while the continuous lines represent the values of the constants for the same station, found by our method.

From these we can see that the variations of the values of the constants C, e, w, V, in these three stations, show a considerable analogy.

Thus, constant C, shows a slight decrease from the beginning of the 19th century till the period 1914 - 23, whence begins again to increase. This decrease is more obvious and uniform for Vienna, while for the other two stations, is interrupted by slight fluctuations of the values of C.

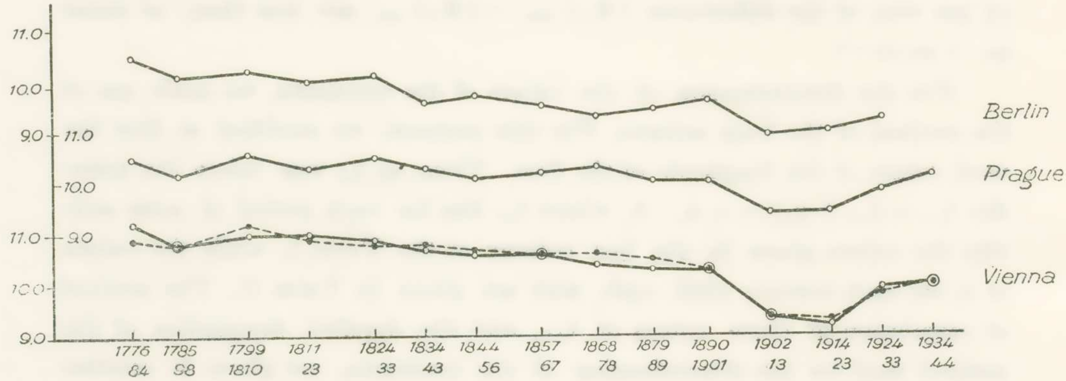

Fig. 1. Values of C.

Constant e, on the contrary, shows remarkable fluctuations, with two distinct minima, the first during the period 1824 - 33 and the second during the periods 1902 - 13 and 1914 - 23.

The phase angles also, show remarkable variations.

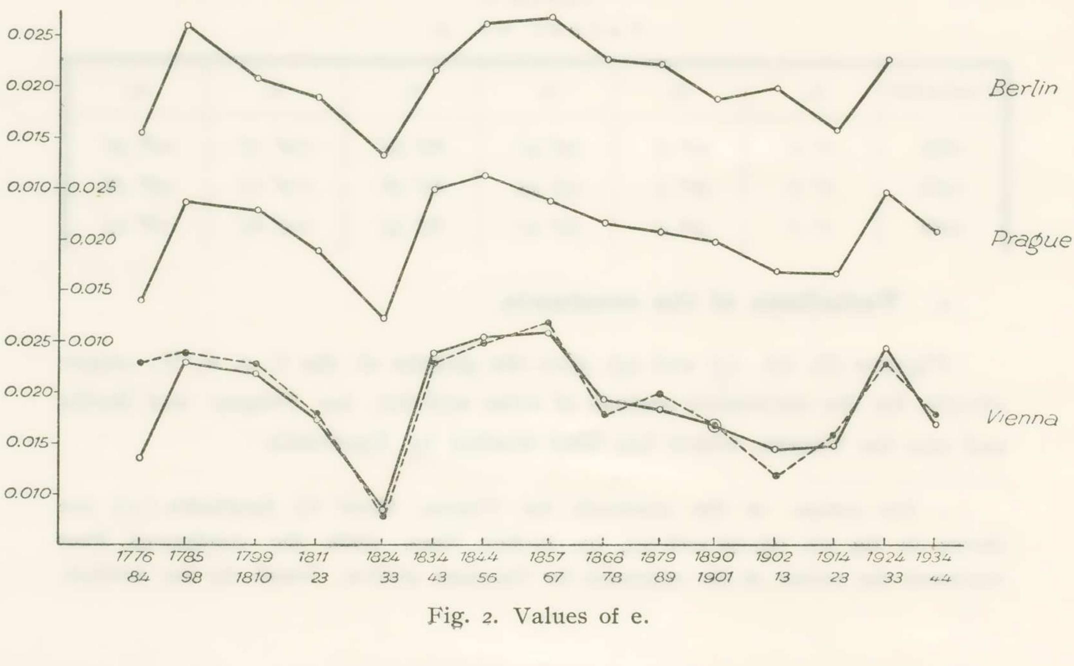

Fig. 2. Values of e.

Thus, angle w shows fluctuations of a considerable range, with a distinct minimum during the period 1824—33 and fairly clear maxima during the periods 1868—78 and 1914—23.

Angle V, on the contrary, shows fluctuations of a smaller range, with fairly clear minima during the periods 1811—23, 1857—67 and 1890—1901.

3. Seasonal temperatures.

As we have already stated, Xanthakis transfers, with the help of relations (5), (6), (7), the study of the variations of the seasonal temperatures, to the study of the variations of the constants in relations (1), (2).

It is interesting, therefore, to examine whether relations (5), (6) and (7) are also verified for the two stations of the Central Europe considered.

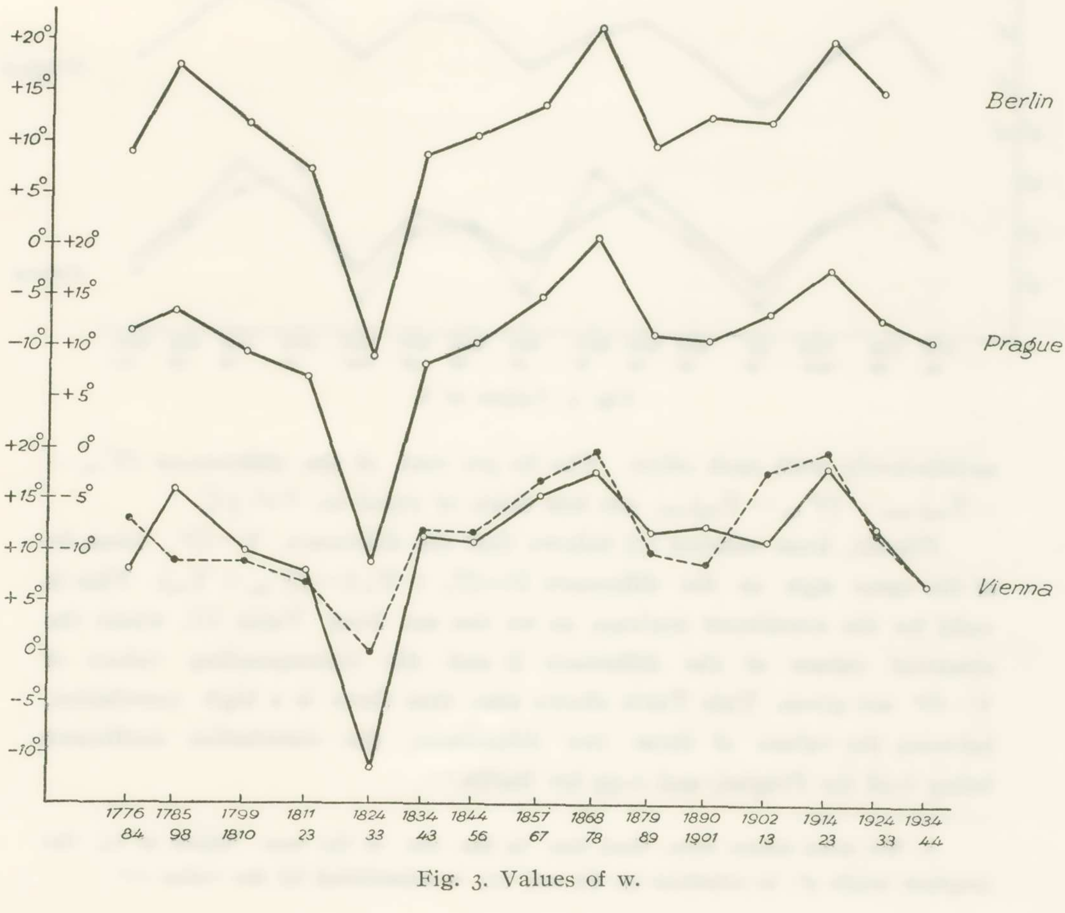

Fig. 3. Values of w.

Relative research has shown that, in fact, these relations[1] are satisfactorily verified by the air temperature data of these stations. Thus, Table III, gives the observed and calculated by relation (5) values of the difference $T_h - T_c$, for each period of solar activity. As we see, the agreement of these two values is satisfactory. All the differences $(T_h - T_c)_{obs.} - (T_h - T_c)_{cal.}$, are less than, or equal to, $+ 0^\circ.2$ C.

In Table III, are also given, the observed and calculated by relation (6) values of the difference $T'_{eq} - T_{eq}$. Again, these two values, agree

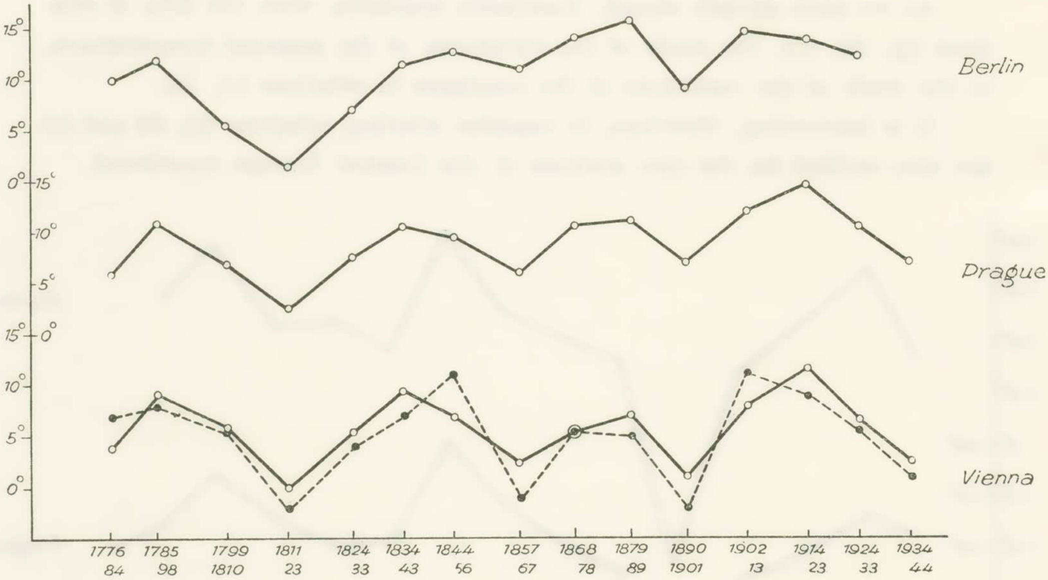

Fig. 4. Values of V.

satisfactorily with each other. The 80 per cent of the differences $(T'_{eq} - T_{eq})_{obs.} - (T'_{eq} - T_{eq})_{cal.}$ are less than, or equal to, $\pm 0^\circ.3$ C.

Finally, from relation (7) follows that the difference $V - 11^\circ$, must be of the same sign as the difference $D = (T_s + T_w) - (T'_{eq} + T_{eq})$. This is valid for the considered stations, as we can see from Table III, where the observed values of the difference D and the corresponding values of $V - 11^\circ$ are given. This Table shows also, that there is a high correlation, between the values of these two differences, the correlation coefficient being 0.98 for Prague, and 0.99 for Berlin.

1. We must notice here, that, due to the use of the new values of L_i, the constant angle 9°, in relations (5), (6) and (7), is substituted by the value 11°.

TABLE III

Values of the seasonal temperatures

PERIODS	PRAGUE								BERLIN							
	$T_h - T_c$			$T'_{eq} - T_{eq}$			D	V—II °	$T_h - T_c$			$T'_{eq} - T_{eq}$			D	V—II °
	Obs.	Cal.	Dif.	Obs.	Cal.	Dif.			Obs.	Cal.	Dif.	Obs.	Cal.	Dif.		
1776—84	17.37	17.45	—0.08	5.36	5.37	—0.01	—1.17	—5.0	17.40	17.51	—0.11	5.47	5.52	—0.05	—0.20	—1.2
1785—98	16.90	17.10	—0.20	6.33	5.78	+0.55	+0.01	—0.1	16.69	16.86	—0.17	6.27	5.81	+0.46	+0.20	+1.0
1799—1810	17.68	17.72	—0.04	7.25	6.85	+0.40	—0.71	—4.1	16.88	16.94	—0.06	6.99	6.67	+0.32	—0.98	—5.5
1811—23	17.11	17.11	0.00	5.45	5.19	+0.26	—1.89	—8.5	16.51	16.55	—0.04	5.38	5.27	+0.11	—1.99	—9.4
1824—33	17.57	17.60	—0.03	5.81	5.71	+0.10	—1.00	—3.5	16.70	16.77	—0.07	5.51	5.20	+0.31	—1.08	—4.2
1834—43	17.30	17.25	+0.05	6.84	6.74	+0.10	—0.07	—0.5	16.02	16.04	—0.02	6.37	6.07	+0.30	+0.10	+0.4
1844—56	16.82	16.89	—0.07	6.53	6.27	+0.26	—0.22	—1.4	16.09	16.14	—0.05	6.54	6.33	+0.21	+0.43	+1.4
1857—67	17.02	17.00	+0.02	6.18	6.00	+0.18	—1.39	—5.1	15.80	15.83	—0.03	6.45	6.18	+0.27	—0.11	—0.2
1868—78	17.17	17.32	—0.15	5.86	5.89	—0.03	—0.17	—0.4	15.48	15.59	—0.11	5.59	5.76	—0.17	+0.56	+2.8
1879—89	16.58	16.78	—0.20	6.13	5.75	+0.38	+0.03	—0.1	15.48	15.73	—0.25	6.39	5.99	+0.40	+1.06	+4.5
1890—1901	16.74	16.74	0.00	5.70	5.79	—0.09	—0.97	—3.9	15.97	15.97	0.00	5.52	5.52	0.00	—0.48	—2.2
1902—13	15.82	15.76	+0.06	4.81	4.66	+0.15	+0.52	+1.2	14.97	14.93	+0.04	5.14	4.86	+0.28	+0.96	+3.6
1914—23	15.85	15.70	+0.15	4.86	4.64	+0.22	+0.75	+3.4	15.06	15.01	+0.05	4.75	4.31	+0.44	+0.61	+2.5
1924—33	16.36	16.41	—0.05	6.35	6.41	—0.06	+0.10	—0.4	15.40	15.36	+0.04	6.11	6.10	+0.01	+0.38	+1.0
1934—44	16.70	16.78	—0.08	5.86	6.09	—0.23	—0.88	—4.2								

After proving the validity of relations (5), (6) and (7) for the stations under consideration, we can study now, the variations of the seasonal temperatures in these stations, from period to period of solar activity, with the help of fig. (1), (2), (3) and (4).

Thus, the difference $T_h - T_c$ must show, like C, a decrease from the beginning of the 19th century till the period 1914—23, whence it must begin to increase. This is very easily seen, in Table III, from which we find that the range of this decrease amounts approximately to 2^0 C, in both stations.

The difference $T'_{eq} - T_{eq}$, on the contrary, must show, like p and e, considerable fluctuations. That this is actually the case we can see from Table III, from which we find that the range of this fluctuation, for the time interval considered, amounts approximately to $2^0.4$ C in Prague, and $2^0.2$ C in Berlin.

Finally the difference $D=(T_s + T_w) - (T'_{eq} + T_{eq})$, shows also fluctuations, analogous to those of V—II°, with a range of $2^0.6$ C for Prague and 3^0 C for Berlin.

4. **Mathematical expression of the annual variation.**

Prof. Xanthakis has shown [3], that relations (3) and (4) express satisfactorily the annual variation of the observed mean monthly air temperatures for the 6 stations studied by him. At the same conclusion we arrived for the two new stations, under consideration. The Table of the observed and calculated by relations (3) and (4) mean monthly air temperatures for these stations, during the successive periods of solar activity, is given in the above mentioned paper of ours [7]. Here we testrict ourselves to say, that the 82 per cent of the differences $T_{obs.} - T_{cal.}$, are less than, or equal to, $\pm 0^0.5$ C.

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ΠΕΡΙΛΗΨΙΣ

Εἰς τὴν παροῦσαν ἐργασίαν ἐπεκτείνονται αἱ ἔρευναι τοῦ καθηγητοῦ κ. Ἰωάννου Ξανθάκη αἱ σχετικαὶ μὲ τὰς μέσας μηνιαίας θερμοκρασίας τοῦ ἀέρος κατὰ τὰς περιόδους τῆς ἡλιακῆς δράσεως εἰς τὴν Κεντρικὴν Εὐρώπην (Πράγα, Βερολῖνον).

Διεπιστώθη ὅτι καὶ διὰ τοὺς σταθμοὺς τούτους ἐπαληθεύονται λίαν ἱκανοποιητικῶς αἱ ὑπὸ τοῦ Ἰ. Ξανθάκη δοθεῖσαι νέαι μαθηματικαὶ σχέσεις.

Τέλος ἀξιοσημείωτον τυγχάνει τὸ γεγονὸς ὅτι αἱ εὑρεθεῖσαι τιμαὶ τῶν σταθερῶν διὰ τοὺς σταθμοὺς τούτους, διὰ τὸν ὑπολογισμὸν τῶν ὁποίων ἐχρησιμοποιήθη νέα μέθοδος, παρουσιάζουν ἀπὸ περιόδου εἰς περίοδον τῆς ἡλιακῆς δράσεως μεταβολάς, ἀναλόγους πρὸς τὰς μεταβολὰς τῶν ὑπὸ τοῦ Ἰ. Ξανθάκη δοθεισῶν τιμῶν τῶν σταθερῶν διὰ τὴν Βιέννην.