agreement is good owing, evidently, to the presence in them of a great number of extragalactic nebulae and consequently to the higher accuracy of counts in those regions.

We shall mention here once more that the results stated here may be regarded only as preliminary but even in such an appearance they lead us to interesting conclusions and, principally, indicate that the completion of work on the determination of color-indices of large number of stars promises us to give new and reliable results.

Our immediate tasks are the precise determination of the effective wave-lengths of our system, the foundation of a system of normal colours and making more accurate all reductions and in the first place the equations connecting our color-indices with the international ones. As to the further collecting of the material we intend to give the list of color-indices of stars in KSA within the zone of $b=\pm 10-20^\circ$ and besides, to widen our published lists of the zone $b=\pm 0-10^\circ$ with supplementary stars which had been measured but had not been for some reasons included in the lists. The discussion of the material must also include the question about the law of the dependence upon the wave-length. At last the data of our work must be connected with known results of detailed investigation of some clouds of absorbing matter, particularly,—with minute investigations of regions of Auriga, Cygnus and others where our KSA are located.

For valuable criticism the writer is much indebted to Dr. G. A. Shajn, who had kindly read the manuscript.

My thanks are also to my colleagues M. A. Vashakidse and V. B. Nikonov for their interest in this investigation and for friendly discussion relating to the problems and methodics of this work.

April, 1943.

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БЮЛЛЕТЕНЬ АБАСТУМАНСКОЙ АСТРОФИЗИЧЕСКОЙ ОБСЕРВАТОРИИ № 7. 1943
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THE STUDY OF SELECTIVE ABSORPTION IN THE REGION OF THE RIFT OF MILKY WAY IN AQUILA

P. Th. SHAJN

Introduction. The region of the rift of the Milky Way near Aquila deserves special attention. First, the dark region is exceptionally large. All the known dark nebulae seem to be of very moderate size when compared with it. Perhaps, an analogy may be drawn between this region and some dark details observed sometimes in the extragalactic nebulae. But this region is also of interest from another point of view. Namely, not long ago one believed that in addition to the separate dark nebulae there is near the middle plane of the Milky Way a layer of selectively absorbing matter continuously extending at least on 1000—2000 parsecs. At present we have some evidences in favour of the hypothesis on discontinuous distribution of the absorbing matter on the sky as well as in space. In this case the color-excess must increase not uniformly with increasing distance and will be zero till in the given direction a cloud is encountered. Then we shall have a more or less rapid increase of C. E. in dependence on the optical thickness of the cloud. For the stars behind it the color-excess will be constant till in the same line of sight is encountered a second cloud causing a new jump in the C. E. Therefore, the change in the color-excess with increasing distance or apparent magnitude will be generally of discontinuous character. But till now we have no serious observational evidences in favour of such correlation between C. E. and the distance.

The dark region under consideration is of great size and therefore there is some reason to expect that the absorbing matter is continuously extended also deep in space. This investigation will allow to judge to some degree whether or not this region differs radically from the usual dark nebulae with respect to the spatial distribution of absorbing matter.

The present paper is an extension of the preliminary one published in Circ. Poulk. Obs. N. 22—23, 1937. Instead of the two large areas containing about 700 stars we have now nine smaller areas embracing at all 1633 stars of type A and B. Here are included almost all stars of type A and B taken from H. D. E. (H. A. 100, No. 2) and H. D. C. within the limits 18^h38^m—19^h36^m in α and $+10^\circ.2$—$+19^\circ.5$ in δ. The centres are as follows 18^h48^m, $+12^\circ$; 18^h48^m, $+17^\circ$; 19^h6^m, $+12^\circ$; 19^h6^m, $+17^\circ$; 19^h25^m, $+12^\circ$; 19^h25^m, $+17^\circ$; 19^h0^m, $+18^\circ$; 19^h16^m, $+18$; 19^h32^m, $+11^\circ$. In addition we have obtained three areas for control with the centres: 19^h30^m, $+11^\circ$; 18^h57^m, $+15^\circ$; 19^h16^m, $+15^\circ$.

Material. The observations were made with a Zeiss double astrograph. The aperture of the object-glasses Unar is 120 mm and their focal length is about 600 mm. For obtaining photovisual magnitudes plates Astra IX with Schott's filter GG_{11} were used. The effective wave-length for stars of A type turns out to be 5500±60 Å. For the photographic magnitudes plates Imperial 1200 without filter were used (the effective wave-length is 4400±60 Å). In our former investigation when using other constants the effective wave-lengths were 5100 Å and 4200 Å, respectively.

The new series of observations has been obtained in 1938, 1939, 1940. The exposu re for the photovisual and photographic plates was mostly 35 and 18 minutes respectively. For the study of the error connected with the size of the image we have obtained a considerable number of plates with short exposures (about 7 and 4 minutes for photovisual and photographic magnitudes). Just before or after the exposure of the region we have photographed the N. P. S. The plates for the region and the Pole were cut out of one large plate and developed si multaneously in the same bath (Metol). But the short exposure images of the region and the N. P. S. have been taken on the same plate (the region twice, before and after the Pole). In 1940 we have generally photographed the Pole (twice) and the region on the same plate, independently on the length of exposure. The majority of stars were measured on 5 and more plates obtained under the best conditions. The plates partly overlap each other. The magnitudes of stars were measured by means of a small scale consisting of a series of images of stars taken with exposure ratio $\sqrt{2}$ for two successive images. The scales for photographic and photovisual images were made on plates Imperial 1200 and Astra IX (filter GG_{11}). The measurements were done on a spectrocomparator somewhat reconstructed so that the plate and the scale were seen simultaneously in the eye-piece.

Correction for differential absorption in the atmosphere. The dependence of stellar magnitudes on the distance from the plate centre. The conditions of observations did not permit to take plates of the region and the Pole strictly at the same zenith distance. For the transmission coefficients p for the photographic and photovisual plates have been adopted the mean values for Mt Wilson and

Washington: p(4400)=0.700, p(5500)=0.810. The computed corrections for the difference in the zenith distances range from $0^m.02$ to $0^m.16$. When computing the corrections we used Bemporad's tables.

For the investigation of the error depending on the distance from the centre of the plate we have obtained four plates (Pleiades). On each plate we have measured 10 stars of different brightness, the number of images for each star being 8—10. The mean results do not bring out any sensible systematic error in dependence on the distance from the centre $2^\circ.5$ in α as well as in δ. In the former paper[1] it was found that this error does not surpass $0^m.06$ for the distance $2^\circ.7$ from the centre. This is in general confirmed in the present investigation, but the systematic character of the error in question is expressed here not so evidently. We have here rather an error in dependence on the position angle on the plate. But because of the insignificance of the latter we did not introduce this correction at all.

Color-equation. When drawing the reduction curves based on the N. P. S. there was revealed an appreciable scattering of points connected with the color of stars. Basing on the material for the N. P. S. stars the following color equations for photographic and photovisual magnitudes were derived:

$$m'_{pg} = m_{pg} - \underset{\pm 0.011}{0.135}\ \text{C. I.}$$

$$m'_{pv} = m_{pv} + \underset{\pm 0.012}{0.055}\ \text{C. I.}$$

where m'_{pg} and m'_{pv} are the observed photographic and photovisual magnitudes, m_{pg} and m_{pv}—the N. P. S. magnitudes, C. I.—the preliminary value of the observed color-index. Whence we have obtained the corrections to the N. P. S. values. The final reduction drawn with these magnitudes gave some scattering of points, depending only on accidental errors but not on the color. The constants of the color equations given above differ from those in our former paper[2]. The difference in the color system is not surprising since we have used now other plates and other filters.

Systematic error. We tried to obtain higher accuracy than in our former investigation and this was reached owing to the increase of the number of plates. For unexplained reasons several plates bring out considerable deviations (in one case reaching even $0^m.6$). As it was mentioned above we have measured 5—6 best plates for each area. The probable error turns out now to be $\pm 0^m.083$ for a plate and $\pm 0^m.04$ for a star (nearly the same for m_{pg} and m_{pv}). The probable errors have been computed by Peters' formula. The results given above are the mean values of p.e. for 77 stars taken at random in different parts of our catalogue.

For well known reasons the systematic error can play an important rôle in our work. It would be very dangerous if the systematic error were a function of the apparent magnitude. We have obtained for each area several plates with long and short exposures and this allowed us to judge whether the measured magnitude depends on the size of the image. In fact, such a dependence was not found. On the other hand we were able to compare our magnitudes of many stars with those in other published catalogues. The results are as follows: 1) m_{pg} and m_{pe} (Simeis) are brighter in the mean by $0^m.20$ and $0^m.25$ than m_{pg} (Götting. Aktin.) and m_{pe} (Potsdam) respectively. Therefore C. I. (Simeis)—C. I. (Göt. Akt.) $= +0^m.05$. 2) The comparison of m_{pg} (Simeis) for a small number of stars common with Greenwich[3], Mount Wilson[4] and Lick[5] (Smith) does not bring out any sensible systematic difference.

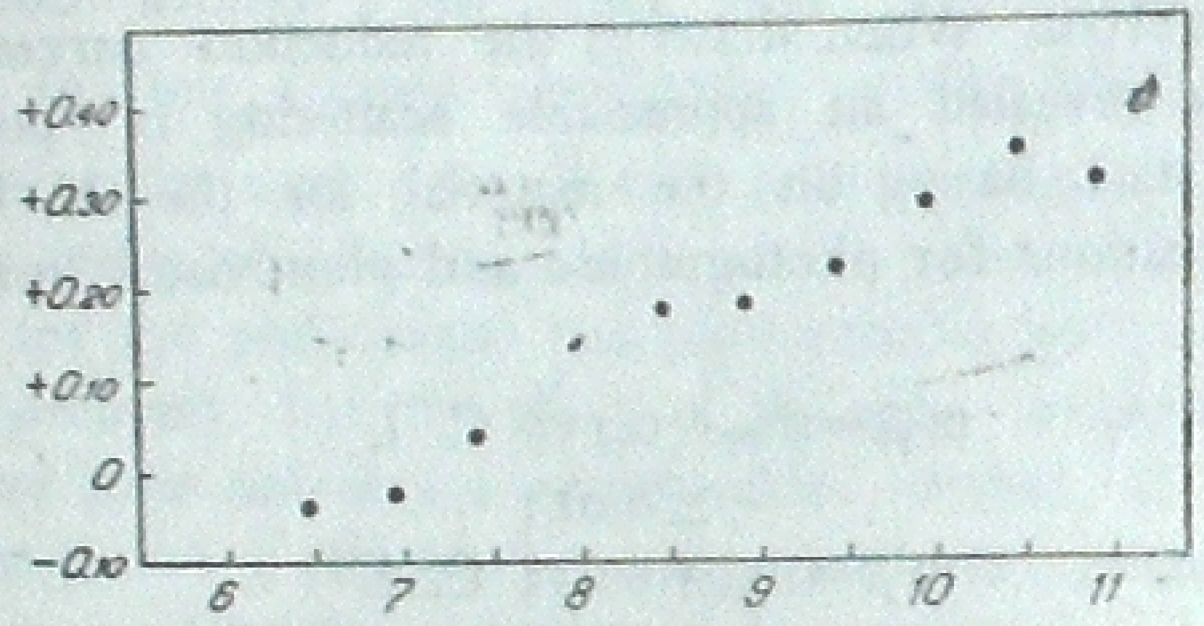

Fig. 1 бәб. The abscissa is the modulus of distance m—M; the ordinate is C. E. (the result is based on the stars within the limits 10^m—11^m).

At last, an investigation was performed which proved that strong selective absorption found by us in several areas is not due to any systematic error depending on the apparent magnitude. The idea is as follows. We have plotted on a graph (ordinate is C. E. and the abscissa is the modulus of distance) all the stars of type B_5—F_5 only within the limits 10^m—11^m (photographic). The region under consideration is 19^h6^m—19^h25^m in α and $10°$—$19°.5$ in δ (it embraces our areas 9, 10, 11, 13, 14). The mean values of C. E. as a function of the modulus m—M is represented in Fig. 1. The amplitude in C. E. corresponding to the difference in the modulus from 6.5 to 10.5 is equal approximately to $0^m.40$ and this is very close to the amplitude of C. E. for the stars of all magnitudes in these areas. Since Fig. 1 relates to stars within one apparent magnitude (10—11) only, the identity of the results must be interpreted as a serious indication that our color-indices are free from a systematic error depending on the apparent magnitude and that the observed increase of C. E. with distance is quite real.

System of C. I. and spectrum. For deriving the standard color-indices we have obtained four plates of the brighter stars belonging to the Pleiades and Hyades. The results of measurements are as follows:

Sp.	C. I.	Sp.	C. I.	Sp.	C. I.
B5	$-0^m.11$	A2	$+0^m.01$	F2	$+0^m.23$
B8	-0.09	A3	$+0.07$	F5	$+0.32$
B9	-0.07	A5	$+0.12$		
A_0-A_1	-0.04	F0	$+0.18$		

Since our effective wave-lengths for m_{pg} and m_{pe} are approximately 4400 Å and 5500 Å, it may be assumed that the system is close to the international one. It is of importance to know whether the standard C. I. given above are normal. Only in the latter case they may serve as a basis in the study of selective absorption. In fact it was suggested by Hertzsprung, Trumpler and others that the stars of later types in the Pleiades are anomalously white. But within B5—A5 types the color is probably normal. As to the interstellar absorption the effect for the Pleiades and Hyades is very small, if any. The galactic latitudes for these clusters are—24° and—22° and their distances are 150 and 40 parsecs respectively. There are seven stars of the Pleiades in the Catalogue of Stebbins and Huffer[6] and the mean C. E. when reduced to the international system does not surpass $+0^m.03$.

We must keep in mind that the error in the zero-point of our standard C. I. affects immediately the derived C. E. and therefore the coefficient of the selective absorption. But we think that the error in question does not surpass $\pm 0^m.06$.

When comparing the results with respect to the selective absorption the derived value for the coefficient is usually reduced to the system of rhe Mount Wilson. For this purpose we observed a number of stars of later spectral classes. But here the giants and dwarfs are intermingled and for this reason we are not able to derive an accurate value for the coefficient of reduction. We think, however, that for our C. I. the factor 1.15 must be adopted.

Selective absorption. The observations allow to confront immediately the C. E. to the modulus of the distance m—M. The observed data are sufficiently accurate and we can consider not only the material as a whole but also each area separately in order to judge on the difference in the selective absorption in various directions. The whole investigated region was divided into 15 areas in such a manner that each of them was approximately homogeneous with respect to the abundance of stars per square degree. When plotting on a graph the observed data for each area we find a more or less uniform increase of the C. E. with the increasing modulus m—M. In several areas the rate of the increase ts more sriong than in other ones. However this difference is mainly connected with the galactic latitude. Independently on the effect of selective absorption and the errors of observations there is a real dispersion of C. I. even within one spectral subdivision. A trustworthy result may be expected if the given group contains not less than 10—20 stars. For this reason the region under consideration was divided after all into three zones: A—western zone including the areas 1, 2, 3, 4, 6, 7, 8 (mean latitude b=+5°.2); B—central zone, the most dark one, including the areas 5, 9, 10, 11, 13 and 14 (mean latitude b=−0°.6); C—eastern zone, the most rich one, including two areas 12, 15 (mean latitude b=−4°).

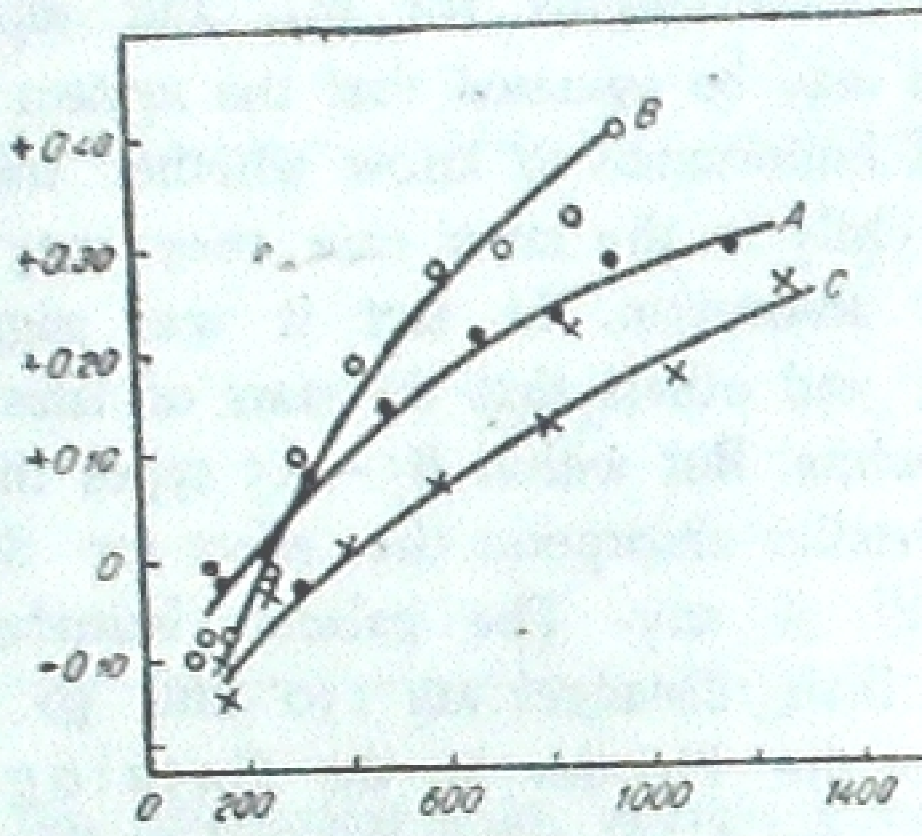

Fig. 2 ნახ. The increase of C. E. with distance; the abscissa is the distance in parsecs, the ordinate is C. E.

The mean results are represented in the Table I and Fig. 2. The interval for the given values of m—M embraces one magnitude, for instance 8.0. corresponds to the interval 7.5—8.5.

TABLE I Ცხრილი

A				B				C			
Modulus m—M	Mean C. E.	Distance	Number of stars	Modulus m—M	Mean C. E.	Distance	Number of stars	Modulus m—M	Mean C. E.	Distance	Number of stars
	m				m				m		
5.5	−0.02	126	7	5.0	−0.03	100	12	5.5	−0.13	126	7
6.0	−0.04	158	17	5.5	−0.01	126	27	6.0	−0.14	158	7
7.0	−0.01	251	47	6.0	−0.05	158	44	7.0	−0.03	251	36
7.5	−0.04	310	88	7.0	−0.02	251	139	8.0	0.00	400	69
8.0	+0.08	344	154	8.0	+0.10	328	209	9.0	+0.06	580	67
9.0	+0.14	486	276	9.0	+0.18	449	300	10.0	+0.12	802	77
10.0	+0.21	685	261	10.0	+0.27	600	316	10.5	+0.21	855	46
11.0	+0.28	951	84	10.5	+0.29	742	194	11.0	+0.16	1167	13
11.5	+0.29	1170	7	11.0	+0.32	871	47	11.5	+0.24	1282	3
				11.5	+0.40	955	10				

For the small values of m—M the C. E. turned out to be negative. May be this is due to a small error in the zero point of our standard stars. As to the zone C this may be due also to the small number of stars.

Our main purpose is the study of the dependence of the C. E. on distance. But the transition from the modulus of distance to the distance itself is a difficult matter. Because of the composite structure of the region under consideration it is highly difficult to derive the value of the general absorption (applying, for instance, Wolf's method). We have selected another way for the account of the general absorption. Namely, as it was recently recognized the selective absorption follows the law λ^{-1}. Adopting that this law holds also for our region and knowing our effective wave-lengths for m_{pg} and m_{pv} we are able to derive the ratio of the general absorption in photographic rays to the color-excess. We have the following formulae:

$$\text{a)}\quad 2.5 \log \frac{I}{I_0} = -t\lambda^{-1} = A$$

$$\text{b)}\quad C.\,E. = t\,(\lambda^{-1}_{4400} - \lambda^{-1}_{5500})$$

$$\text{c)}\quad k = \frac{A_{pg}}{C.\,E.} = \frac{\lambda^{-1}_{4400}}{\lambda^{-1}_{4400} - \lambda^{-1}_{5500}} = 5.3$$

whence the distance r may be computed;

$$5 \log r = m - M + 5 - k\,(C.\,E.)$$

In our computations we have taken k=4. The computed distances for each group of the stars are given in Table I.

It is evident from Fig. 2 that in the region under consideration there is a more or less continuous increase of the selective absorption, most strong in the central dark zone B. Then follows the western zone A, and at last, we have relatively moderate absorption in the eastern rich zone C. But the results with respect to the character of change of the absorption with distance are not conclusive. For several separate areas we have rather an increase of C. E. by steps. Especially Fig. 1 speaks in favour of the discontinuous character of absorption. It seems that in the dark region B is observed an absorption up to 1000 parsecs. The distance for the beginning of absorption is fixed too inaccurately. But one may affirm that the selective absorption is quite sensible already at the distance of 150 parsecs.

In the region under consideration some correspondence between the value of selective absorption and the richness of the stars is observed. But this holds when dividing the region into three above mentioned zones. A detailed study in this respect of separate areas is very difficult and the results are uncertain. However, the positive result with respect to the dependence of absorption on the richness of stars even for the zones A, B, C, may be partly due to the effect of galactic latitude. Below are given the derived values (from Fig. 2) of C. E. for the distance of 1000 parsecs.

	Gal. lat.	C. E.	C. E. in the system of M. W.
A	$+5°2$	$+0^m.20$	$+0^m.33$
B	-0.7	$+0.43$	$+0.50$
C	-4.2	$+0.16$	$+0.18$

The difference in latitude is small but this cannot be neglecred. It appears that in the negative latitudes the absorption is less than in the positive ones.

The region under consideration was partly observed and measured by us several years ago. Now we have nearly 2.5 times more stars as in the preliminary paper. In addition, for the sake of homogeneity the formerly investigated stars were observed and measured auew.

The new observations confirm generally the former results, though the derived selective absorption turned out to be sensibly smaller. It is also of interest to compare our results with those obtained by Miss C. Smith at Lick[7]. The latter investigation was performed simultaneously with our former one. The author has determined the C. I. and spectra of 274 faint stars. The Smith's areas A_1-A_4 occupy the southern border of zone A. Out of her six areas B_1-B_6 of the most dark region only one B_1 falls on the southern border of our zone B. At last, all her four areas C_1-C_4 are somewhat outside of our zone C. For this reason our results are generally not comparable. We have yet a rather good agreement for the brighter zones A and C and a considerable difference for the dark zone B. Miss Smith has found here exceptionally high selective absorption amounting to $1^m.4$ per 1000 parsecs (the mean value is about $1^m.0$). Reducing the Lick and Simeis color system to the Mt. Wilson one we find that the selective absorption per 1000 parsecs, for the dark region turns out to be $0^m.90$ and $0^m.50$, respectively. The agreement is not good, but it is interesting that both results indicate a very strong reddening in this peculiar region of the sky. It may be also added that in our former paper we have obtained a somewhat smaller absorption coefficient than the mean value between the Lick and the new Simeis results. It is also to be emphasized that in all three cases the reddening increases continuously and even more or less uniformly up to 1000 parsecs at least.

The variable stars in the region of the rift. The investigated region embraces approximately 127 square degrees. In Fig. 3 we have plotted the variable stars (taken from «Veränderliche Sterne, 1936») for the region in question as well as for the neighbouring one. Our areas are limited by thin lines. Fig. 3 must be examined side by side with a corresponding photo. There remains no doubt that the dark region of the rift turns out

to be to a large extent a «zone of avoidance» for the variable stars. Unfortunately, the data with respect to the types of these variable stars are mostly lacking. But there is no doubt that the majority are giants or at least absolutely brighter than $+3^m.0$.

In the most dark region we have only five stars: N Sge, T Sge, QR Aql, KS Aql and Nova Sge. Fig. 3 embraces a very vast region of the sky and for this reason we must keep in mind the influence of the galactic latitude. The distribution of the variable stars in Fig. 3 may also serve as a serious argument in favour of the presence of a great absorbing cloud in this region.

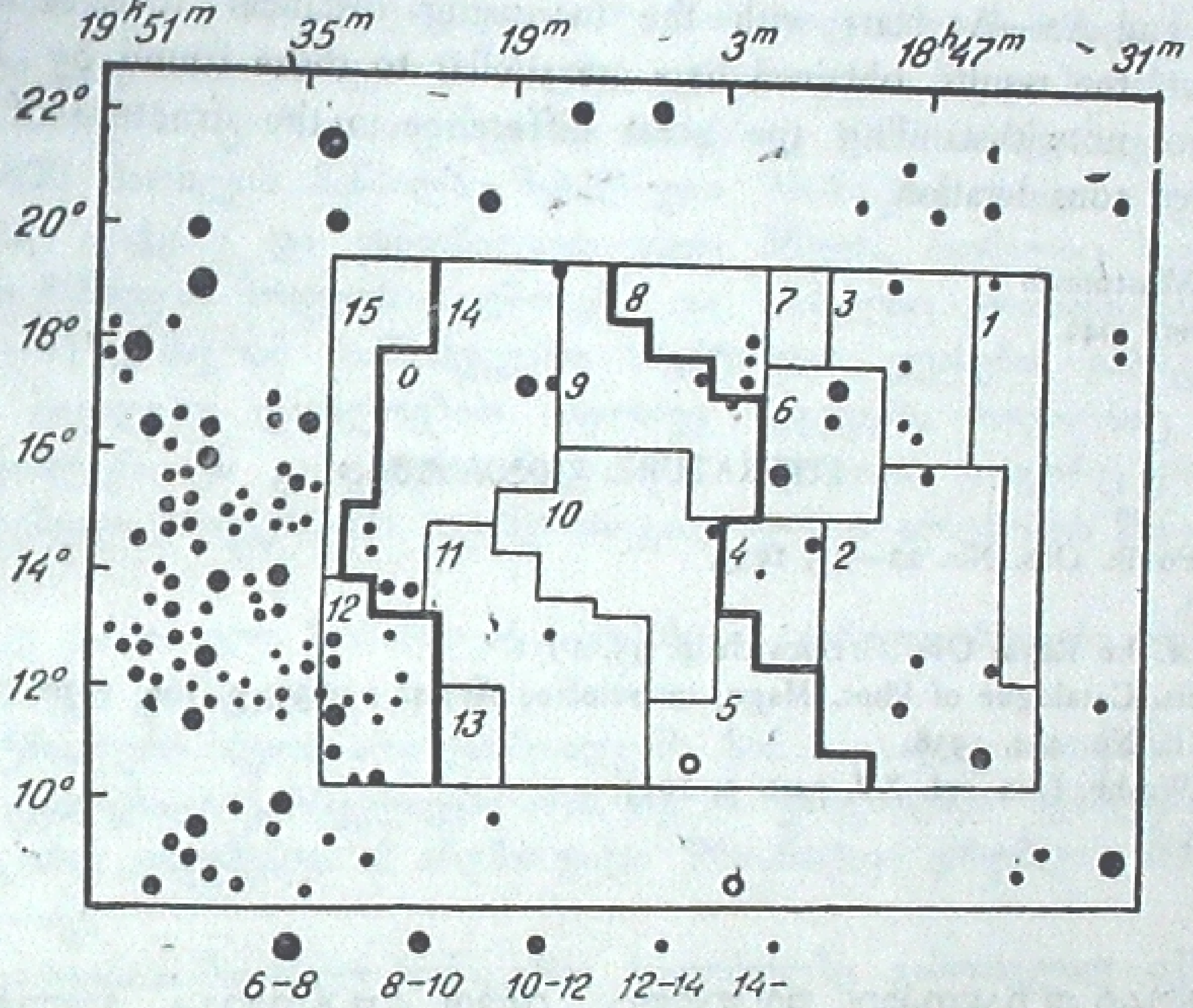

Fig. 3 бзб. The variable stars in the region of the rift.

The change of the density of stars with the increasing distance. In order to judge about the change of the density of stars D(r) with distance it is necessary to know the coefficient of general absorption. The latter was obtained from the derived C. E, (see above). The few observational data show that the space density of B and A stars rapidly decreases with the increasing distance (see, for instance, Bok, Aph. J. 90, p. 260, 1939). It is known that the density gradient for the spectral classes B and A is higher than that for the stars in general. For our region we have a decrease of the density at the distance of 500 parsecs about 1.5—2.2 times for the B_8-A_0 stars and 1.8-2.5 for A_2-A_5 ones. The derived high value for the density gradient partly depends on the adopted value of the coefficient of general absorption. But even if we had assumed for the ratio (general absorption: C. E.) the value 6.0 instead of 4.0, the high negative density gradient could not be removed. Some systematic error in the spectral classification of faint stars may also influence the results. It seems astonishing, that no sensible difference for the function D(r) is observed in our three zones A, B and C. However, it is necessary to note that even the richest zone C is not homogeneous: it embraces a small bright cloud and partly a dark region. The number of the stars in this cloud is small and it could not be considered separately. For the reasons mentioned above the accuracy of the results with respect to the function D(r) is low but we think that the figures as given here characterize to some extent the change of the density of B8—Ao and A2—A5 stars with the increasing distance. It is of interest to note that the results obtained here are similar to those found by Bok for Monoceros notwithstanding the great difference in the structure of the regions under consideration.

Simeis—Abastumani
October, 1942.

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სელექტური შთანთქმის შესწავლა „ირმის ნახტომი"-ს განშტოებაში

ა. შაინი

(რეზიუმე)

ირმის ნახტომის განშტოება Aquila-ს თანავარსკვლავედის არეში განსაკუთრებულ ინტერესს წარმოადგენს სელექტური შთანთქმის შესწავლის თვალსაზრისით: ცის ამ უბანში ბნელი არე სიდიდით შეუდარებლად უფრო მეტია, ვიდრე ყველა სხვა ცნობილი ბნელი ნისლეული და მასში უფროა მოსალოდნელი შთანთქმის განუწყვეტელი ზრდა მანძილის ზრდასთან ერთად.

მოცემული არე შეიცავს მეტად ბნელ ცენტრალურ ზონას (B) და ირმის ნახტომის მეზობელ ორ შტოს (A და C).

კოლორ-ინდექსებისა და კოლორ-ექსცესების განსაზღვრამდე, წინასწარ, გამოკვლეული იქნა ფოტოფირფიტების ფოტომეტრული არის შეცდომა, ფირის განტოლება და სიკაშკაშის განტოლება. პლეადებში ახლო ვარსკვლავთა დაკვირვების საფუძველზე მიღებულ იქნა . კოლორ-ინდექსების ნორმალური მნიშვნელობანი.

სელექტური შთანთქმის შესწავლისათვის გამოყენებულ იქნა B და A კლასების 1633 ვარსკვლავის კოლორ-ექსცესი. შესწორება, რომელიც საჭიროა მანძილთა მოდულებიდან თვით მანძილებზე გადასასვლელად, მიღებულ იქნა კოლორ-ექსცესების დაკვირვებით მოცემულ მნიშვნელობათა და დიფერენციალური შთანთქმის საერთო შთანქმასთან ფარდობის გამოთვლის საფუძველზე. ეს ფარდობა λ^{-1}—კანონის მიხედვით იქნა გამოთვლილი.

აღნიშნული სამი ზონისათვის (A, B, C) სელექტური შთანთქმის კოეფიციენტი აღმოჩნდა $+0^{m}.29$, $0^{m}.43$ და $+0^{m}.16$-ის ტოლი, შესაბამისად. შთანთქმა შესამჩნევია უკვე 150 პარსეკის მანძილზე. ცენტრალური ბნელი ზონისათვის (B) შთანთქმა იზრდება ცოტად თუ ბევრად თანაბრად 1000 პარსეკამდე. A და C ზონებში 800 პარსეკის მანძილზე შესამჩნევია შთანთქმის ზრდის შემცირება (ნახ. 2). თუ ავაგებთ და განვიხილავთ ისეთ მრუდს, რომელიც სელექტურ შთანთქმას მანძილის მოდულს უკავშირებს და რომელიც ერთიდაიმავე სიდიდის (10^{m}—11^{m}), მაგრამ თანმიმდევარი სპექტრული კლასების ვარსკვლავებს ემყარება, მივიღებთ დაახლოებით ისეთსავე შედეგებს, როგორსაც მთელი მასალა გვაძლევს. ეს გარემოება შეგვიძლია მივიჩნიოთ როგორც ერთგვარი დამოუკიდებელი კრიტერიუმი სიკაშკაშის განტოლების არსებობის წინააღმდეგ (ნახ. 1).

სამივე განხილული ზონისათვის შესამჩნევია დამოკიდებულება სელექტურ შთანთქმისა და ვარსკვლავთ რიცხვს შორის.

ცენტრალური ბნელი არე წარმოადგენს ზონას, სადაც თითქმის სულ არ გვხვდება ცვალებადი ვარსკვლავები (ნახ. 3). ამ გარემოებას შეიძლება შევხედოთ როგორც არგუმენტს ამ არეში დიდი მშთანთქავი ღრუბლის არსებობის სასარგებლოდ.

დაკვირვებით მიღებულ მონაცემთა საფუძველზე გამოთვლილ იქნა ვარსკვლავთ სივრცითი სიმკვრივე, როგორც მანძილის ფუნქცია. 500 პარსეკის მანძილზე სიმკვრივე კლებულობს დაახლოებით 1.8-ჯერ B_8—A_0 ვარსკვლავთათვის და 2.1-ჯერ A_2—A_5 ვარსკვლავთათვის.

სიმეიზი—აბასთუმანი
ოქტომბერი, 1942.