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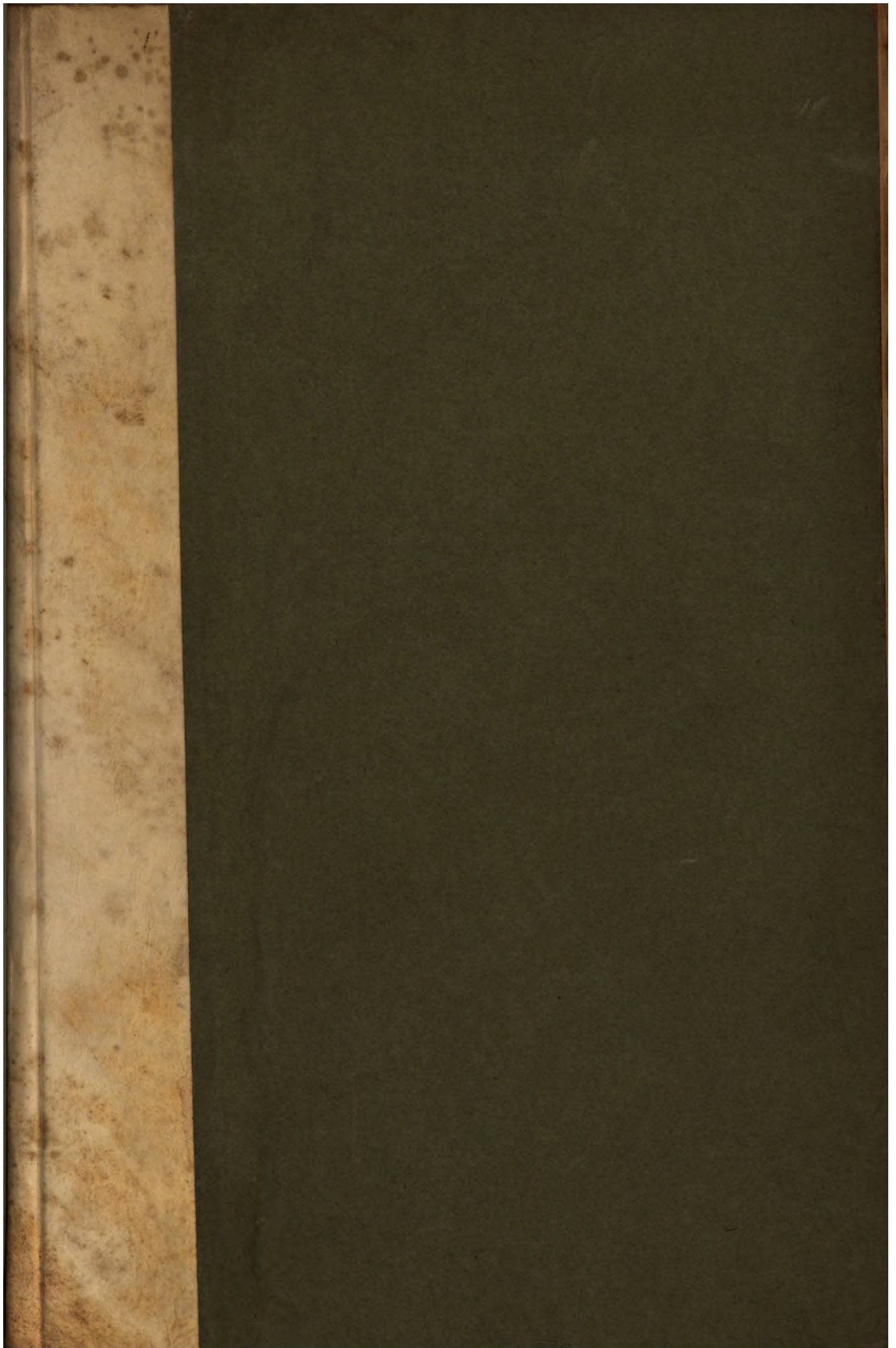
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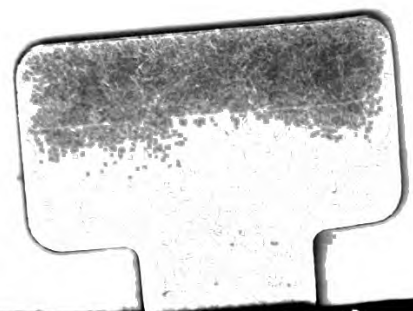


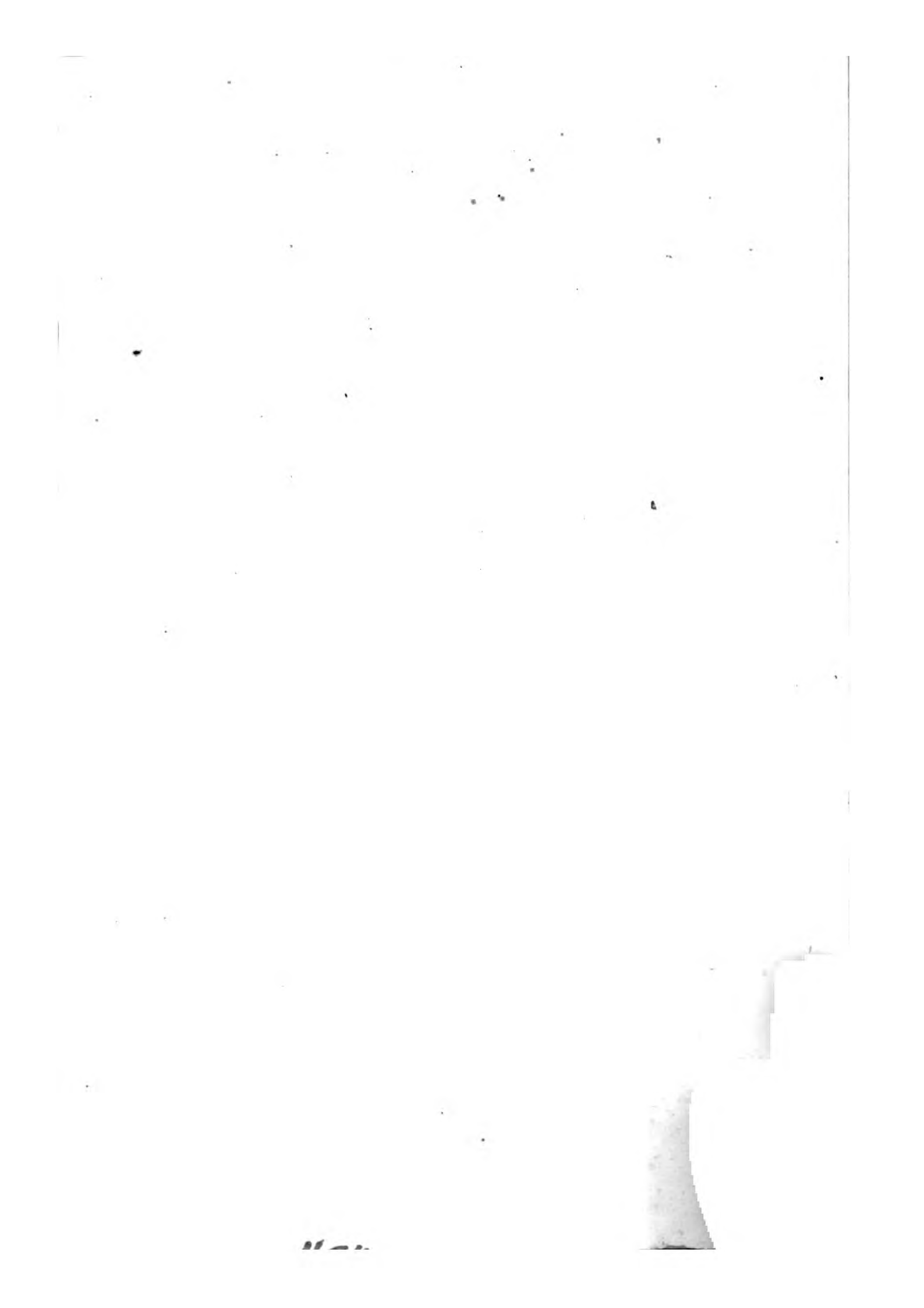
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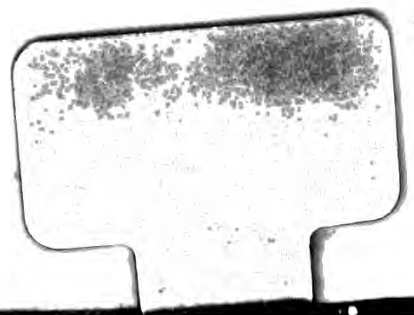
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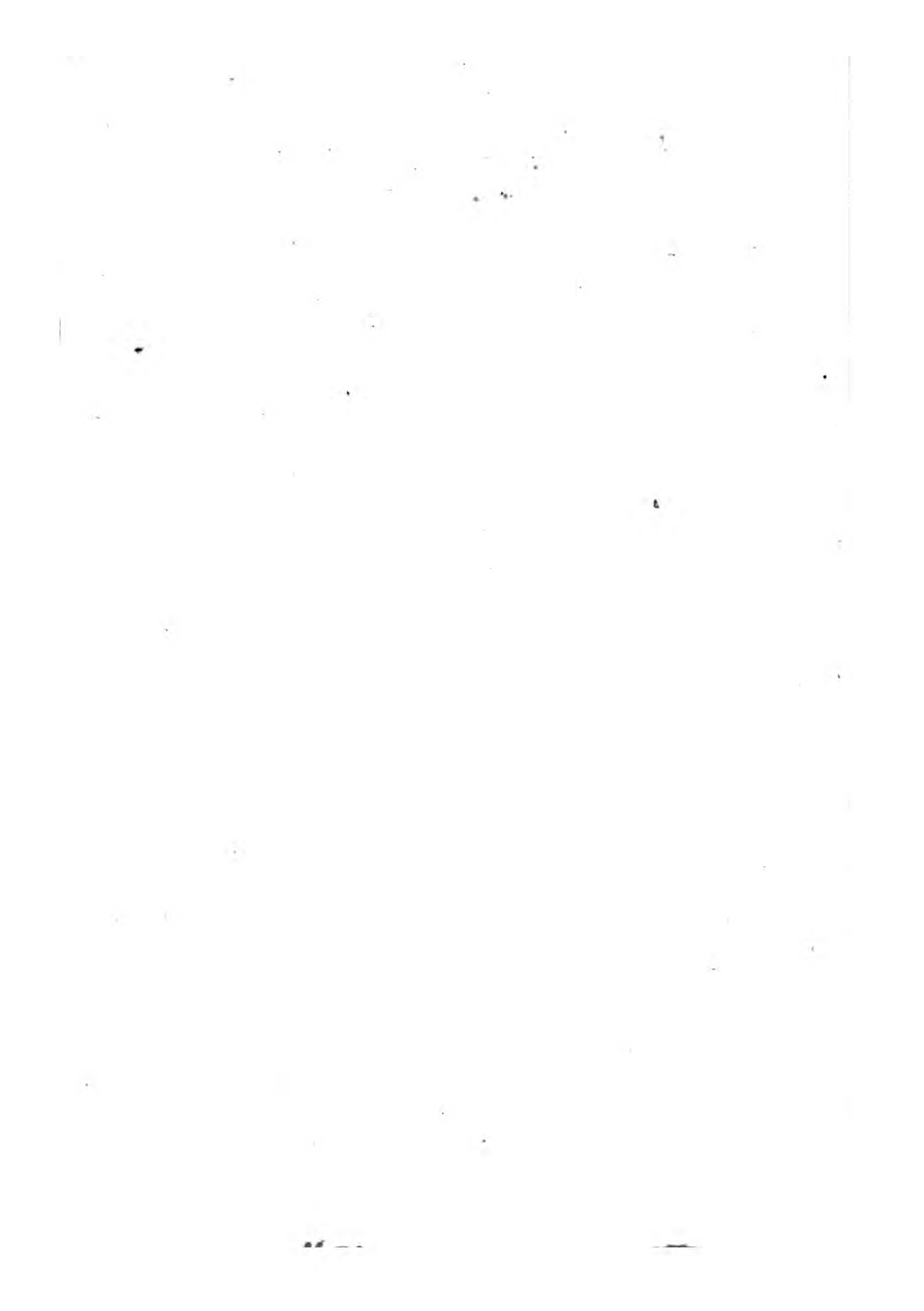






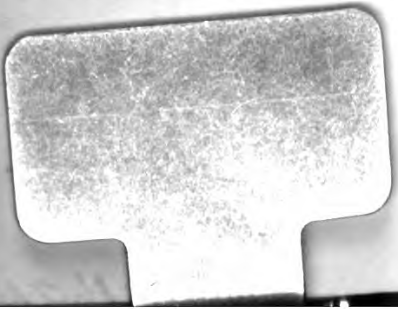
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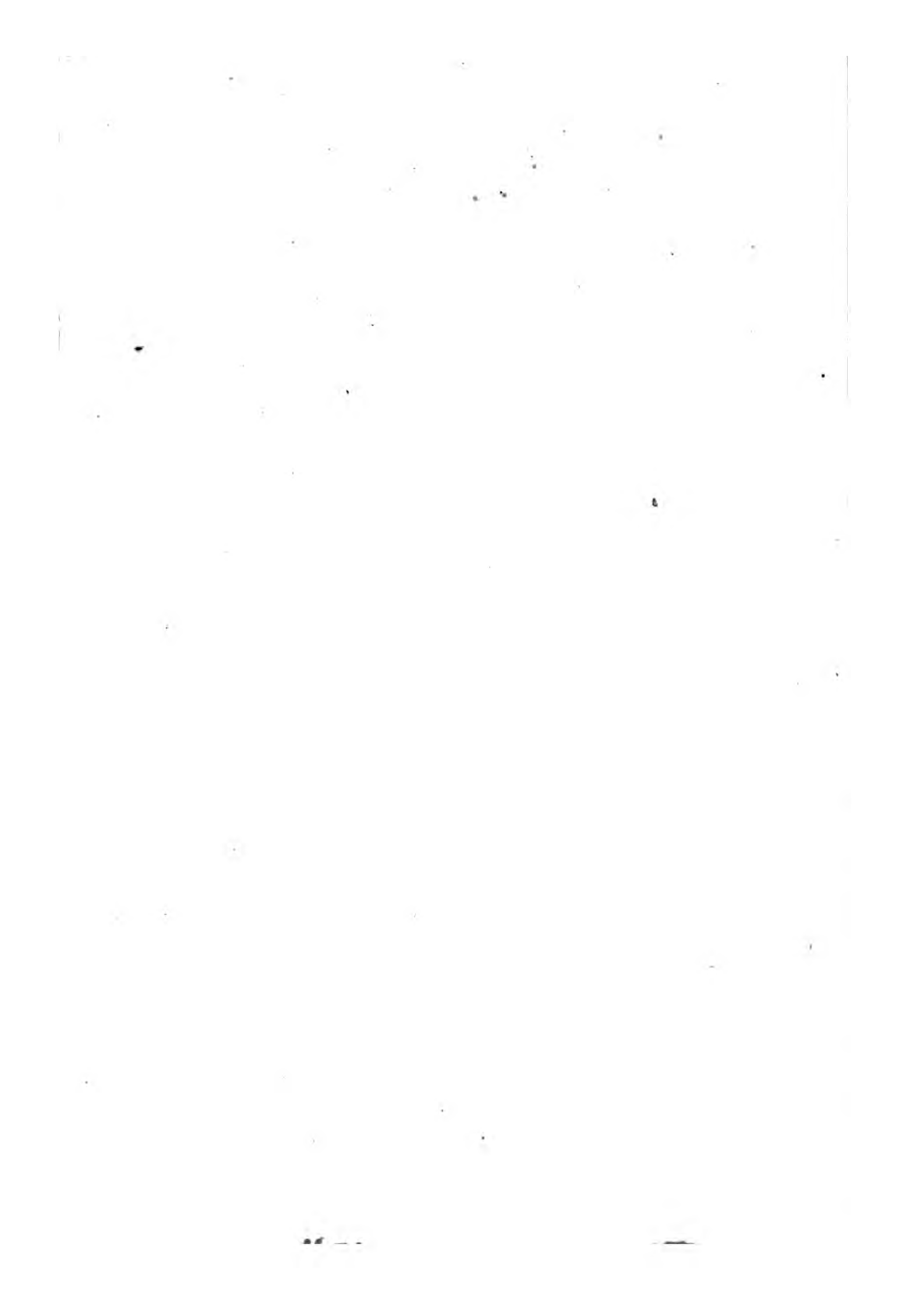






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OF A

OF HEALTH RESORTS

AND THE

REQUIREMENTS OF A HEALTH-SEEKER

WITH

PHYSICAL GEOGRAPHY AND CLIMATE

OF THE ISLE OF MAN.

LECTURE

BY DR. HAVILAND

of the Royal Medical-Chirurgical Society
St. Thomas's Hospital, London
Author of "Climate, Weather, and
Heart Disease, Cancer, and
The Fever Regions of England"
A Paper on "The Geographical
and Flowers," Brit. Med. J.
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A LECTURE

ON THE

ESSENTIAL REQUISITES

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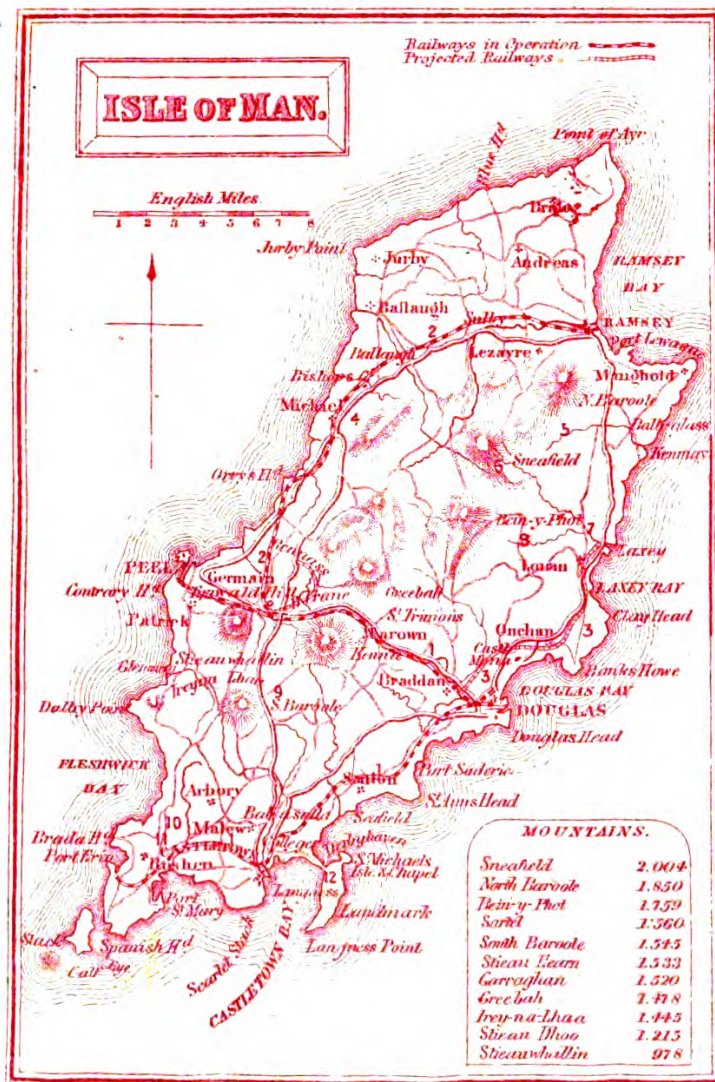
SEA-SIDE HEALTH RESORT,

WITH A SKETCH OF THE

PHYSICAL GEOGRAPHY AND CLIMATE

OF

THE ISLE OF MAN.



BY

ALFRED HAVILAND.

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THE ESSENTIAL REQUISITES

OF A

SEA-SIDE HEALTH RESORT,

AND THE

REQUIREMENTS OF A HEALTH SEEKER;

WITH

THE PHYSICAL GEOGRAPHY AND CLIMATE OF

THE ISLE OF MAN.

A LECTURE

BY

ALFRED HAVILAND, M.R.C.S.E.,

Fellow of the Royal Medico-Chirurgical Society of London;

Late Lecturer at St. Thomas's Hospital, London, on "The Geography of Disease and Public Health"; Author of "Climate, Weather, and Disease"; "The Geographical Distribution of Heart Disease, Cancer, and Consumption in England and Wales"; a Paper on "The Fever Haunts of England and Wales"; The Society of Arts' Silver Medallist, for a Paper on "The Geography of Disease Popularly Considered"; Article on "Fevers and Flowers," Brit. Med. Journal; "The Sanitary Regulations of Ancient Rome"; "English Seaside Health Resorts" in "Knowledge"; "Reports on Brighton and Scarborough as Health Resorts"; &c., &c., &c.

DELIVERED AT THE MASONIC HALL, DOUGLAS,
ISLE OF MAN, 13TH JUNE, 1883,

His Excellency SPENCER WALPOLE, Esq., Lieut.-Governor, in the Chair.

The Proceeds, after Payment of Expenses, will be devoted towards the Fund for the Erection of the Proposed New Hospital for the Isle of Man.

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DOUGLAS, ISLE OF MAN:

JAMES BROWN AND SON, "THE ISLE OF MAN TIMES" OFFICE, ATHOL-STREET.

1694. e. 4.



P R E F A C E .

In the following lecture I have endeavoured to give, as succinctly and forcibly as possible, what has been taught me whilst investigating the sanitary condition of England and its principal sea-side health resorts; and, although all my illustrations, with the exception of what I have given relative to the Physical Geography and Climate of the Isle of Man, are derived from England, I venture to hope that their teaching may be of use to those who are doing their utmost to make this Island take a foremost rank—as it deserves—among British health resorts.

A lengthened residence in this beautiful Isle, a careful investigation of its physical and climatal characters, as well as an attentive and close inquiry—extending over several months—into the health of the native population, have enabled me to form the opinion with which the lecture is concluded.

In dedicating the proceeds from the publication of this lecture to the funds for erecting a New Hospital, I do so in the hope that this great Insular work, so necessary to the reputation of the Island and the welfare of its sick poor, may derive some benefit from having the interest in it, that has already been awakened in the public mind, still further quickened by this most important subject being prominently brought before it.

Having already given my opinion to the Hospital Committee as to the desirability of at once providing a new institution for the relief of the sick poor, I need not dwell further on this subject, but will only quote one passage from my report, in which I described what this Hospital should be so as to make it worthy of this beautiful Island :—

“The New Hospital—for a new one is inevitable—
“should be built with all the modern improvements, in such
“a situation as I have already indicated, where it will form a

“ presentable and attractive building, and be seen by all
 “ visitors on their arrival and departure. It should be made
 “ a favourite and popular institution among the poor and the
 “ rich. Its management should be so complete as to attract
 “ the benevolent, and make them feel assured that their con-
 “ tributions are well bestowed. Its wards and domestic
 “ arrangements should be models for private houses ; and the
 “ public should feel confident that, within its walls, they
 “ would be even better off during sickness than in their
 “ own homes. Such an Hospital would soon find favour in
 “ this Island, and funds would not be wanting to support it.”

In conclusion I have only to say that if what I have
 either written, or otherwise expressed, tend to promote, in how-
 ever humble a manner, this great object, and at the same
 time further the interest in, and a better knowledge of, the
 Isle of Man as a residence and a health resort, I shall be
 gratified, and content to know that my labour has not been
 in vain.

A. H.

THE
E S S E N T I A L R E Q U I S I T E S
OF
OF A SEASIDE HEALTH RESORT, &c.

I —INTRODUCTION.—The Origin of Health Resorts—
The Asclepiads the Founders of the earliest
Greek Sea-side Health Resorts—Cos—Its
Climate compared with that of Mona—The
Mediterranean Sea and the Atlantic Ocean
compared--Hot Springs—"Thermæ"--Water-
ing Places distinct from Sea-side Health
Resorts—Greek, Roman, and British.

THERE can be little doubt but that the unsophisticated minds of the early Greeks very soon became impressed with the unhealthiness of large communities living in walled towns situated on a low level, with rising ground immediately behind them; for we find them at a very remote date selecting what they considered to be the healthiest places for the erection of their temples to those deities who, they believed, presided over their health, and were able to cure diseases and save life.

Historians tell us, and later researches have confirmed their records, that the temples of Æsculapius, Homer's "blameless physician," "were usually built "in healthy places, *on hills outside the town, and near "wells* which were believed to have healing powers."

For instance, the temple of Æsculapius at Epidaurus was one of the most magnificent in Greece, and was situated about five miles S.W. from that town, on elevated ground and surrounded by an extensive grove.

Some of the ruins of this far-famed temple are still extant.

These ancient temples erected for the worship of the Physician-God were the prototypes, not only of our Health Resorts, but of our Hospitals.

Had these temples been erected in the midst of the neighbouring unhealthy towns it is probable that the deity, for whose worship they were founded, would soon have got into disrepute.

Those who first instituted this worship must have had a shrewd suspicion of many of the causes of illness among the settlers by the sea shore, where, near the mouths of the rivers, marsh fevers existed; or within the walls of the inland cities overcrowding was attended with its usual evils. They must have known that removal from such surroundings was the only remedy, and therefore built, above the level of the miasm and away from the city and its polluted air, temples that held out promises of health and life to those who would resort to them and worship in them.

The principles which these wise physician-priests taught by their practice form the very basis of what is found by experience in the present day to be the only successful mode of dealing with a certain class of diseases.

After all, they were only guided by what common sense dictated to them: they saw *disease*; they recognised the *cause*. With the latter they felt themselves impotent to cope; so they contrived to withdraw the victims from its malign influence by promising them health if they worshipped in their

temples that crowned the elevated healthy sites, where pure air and pure water were to be found.

No wonder then that these health resorts, dedicated as they were to the benign physician-god, became famous over the civilised world, or that the deity had the miraculous powers of health-giving and life-saving ascribed to him ; and, laugh as we may at the myths of old, there is to be found in them nevertheless, if we only search for it in the right way, the golden thread of truth interwoven throughout their tissue.

We may sneer as we like at the old Greek legend which tells us that, when Pluto found Æsculapius snatching so many from the grave by his common-sense practice, he prayed to Jupiter to put a stop to his beneficent career, otherwise the number of dead would be diminished.

We can understand that the primitive Greek mind would believe that Zeus or Jupiter would listen to the prayer of his brother Pluto, who reigned in Hades, or the nether world, and whose subjects were the souls of the departed, rather than offend him by permitting a mere man to decrease the death-rate among his fellow-mortals.

We can conceive the feeling of awe that the death of this good man by lightning, "Jove's thunder-bolt," as he was leaning over Glaucus trying to save his life, would produce.

It is easy, too, to imagine the result of the withdrawal by death of such a man from the community, and how soon the sufferers would remind each other of the wonderful cures he performed ; his apotheosis would be the natural sequel, as we find it in India,

according to Sir Alfred Lyall,* in the present day, and those who had learnt the principles on which he based his practice, would carry them out with all the pomp of religious worship, although ever mindful of the means on which their success in healing and in saving life depended.

It is curious to note that, in this legend of Pluto, whom Æsculapius had robbed of his subjects, is the only instance on record, so far as I know, of a low death-rate being a cause of complaint.

Referring to elevated sites being selected on account of their healthfulness, we cannot but admire the bold project of the sculptor who proposed to convert the limestone mass of Mount Athos† into a statue of Alexander the Great, holding a city in one hand and a spring in the other.

He must have remembered how great the danger had been to which the conqueror had been subject, and to which he at last succumbed, when he entered the vanquished and fever-stricken cities of the plains, such as Babylon.

Cos, the island now known as Stanchio, is by far the most celebrated of the sea-side health resorts of antiquity.

It was one of "the scattered" islands, lying a few miles to the west of the coast of Asia Minor, in the Mediterranean Sea, and to the south-west of the once far-famed Halicarnassus, from which it was separated by about thirteen miles of sea.

Here the descendants of Æsculapius erected their typical temple, the Asclepieum, near the city

* "Asiatic Studies, Religious and Social." London: Murray, 1882.

† 6,786 feet altitude.

of Cos, on the north-east end of the island, which was sacred to the god-physician.

Its insular climate, pure water, pure air, great fertility, and natural beauty all conduced to make it a fitting place for a temple devoted to the healing of those who flocked to it from the Greek cities in Asia Minor and Europe to be cured.

In this island the healing art was a sacred office held hereditarily from father to son by the descendants of Æsculapius, who were called Asclepiads.

This remarkable family received not only oral, but written instructions from their predecessors: for within their temple were suspended, from the remotest time of its existence, tablets whereon were written descriptions of the cases that presented themselves, and the line of treatment adopted and found to be successful.

These remarkable records were the very prototypes of those *Hospital Reports* of the present day, which every practical medical man so values.

These medical and surgical reports of cases within the walls of the Temple of Æsculapius, at Cos, laid the foundation for those immortal writings on climate, by Hippocrates the Great, which are read to this day with interest and advantage throughout the civilized world.

This great physician, who was born at Cos, about 460 B.C., was an Asclepiad, and practised in the Temple, among the Isles of the Mediterranean, and in the continents of Greece and Asia Minor, where he gathered experience of diseases, countries, peoples, climates, plants, minerals, and waters.

The accumulated knowledge of his ancestors, and

his own personal practical experience he embodied in works which will live so long as the art of medicine is practised.

His work on "Airs, Waters, and Places" is a standard classic now on climate, and will ever remain one.

His aphorisms, which begin with the celebrated line, that "Life is short, but Art is long," are full of wisdom, applicable to every day practice in this country; and his works on epidemics, diet in certain diseases, and his prognostics, which treat of disease forecasting, all give evidence of the vastness of the treasure of medical lore he found stored within the temple, and how he must have enriched that store with treasures which by his own labour he had culled from the wide field of practice over which his long life and fondness of nature enabled him to extend his observations.

Hippocrates died at the age of 104, at Larissa, in Thessaly. Not only did Cos give birth to the greatest physician of antiquity, but the greatest painter, Apelles, the companion and friend of Alexander the Great, who consecrated to the temple of his native land the finest of his pictures, Venus rising from the sea, the well-known "Venus Anadyomene."

Appelles, too, like Hippocrates, left behind him for his followers, as Pliny tells us, a memorable phrase, "nulla dies sine linea"; a precept which Haydon never failed to impress upon his pupils, Landseer, Harvey, Eastlake, and others, whose renown shows how successfully they carried it out.

It is both interesting and instructive to note the

situation of a small island for health purposes by the ancients.

It seems as if, even in those early times, they had become aware, by practical experience, of the value of obtaining as small a range of temperature as possible, and this we know now can only be enjoyed on a limited insular site; a knowledge, however, that we have only acquired by lengthened series of observations extended over a wide area of the earth's surface.

The ancients, however, were careful observers of nature, and it is possible that, in a fertile country like Cos, where a great variety of plants were indigenous and cultivated, they had noted some peculiar to it, which survived throughout the year, but which in the adjoining continental lands were unable to stand the extremes of temperature that we know characterise their climates.

The sea, except as the great modifier of climate, was evidently not the attraction, for we do not find the early physicians sending their patients to the sea side for the sake of sea bathing; although the sea air as opposed to town air was evidently held in high repute by them.

In fact we find very little mention of sea bathing amongst the ancients; they, however, were fond of their rivers, and we find Homer describing his heroes and heroines bathing and disporting in the beautiful rivers of their country.

We also find the same poet mentioning that Diomedes and Ulysses, after great fatigue, "went into the sea to cleanse themselves."

Later authors tell us, as Athenæus, who wrote in

the third century of the Christian æra, that people, if the sea was within a convenient distance, commonly bathed in it rather than in rivers, the *salt water* being thought “conducive to the strengthening of the nerves by drying up superfluous humours.”

A Roman writer also, Minutius Felix, who wrote about the same time as the last, makes one of his characters in a dialogue say that he was resolved to go to the most pleasant city Ostia (an ancient port at the mouth of the Tiber about sixteen miles from Rome, but now silted up and three miles from the shore) in order to enjoy the bathing in the sea, which is an easy and expeditious method of drying up the superfluous humours of the body.

It may not be uninteresting to draw a comparison between the earliest known health resort and one of the most modern—the Isle of Man.

Both are small islands, oblong in form, and have their long diameters between N.E. and S.W. : Cos being about twenty-eight miles long and between eight and nine miles across at its widest part ; whilst the Isle of Man is thirty miles long and twelve miles wide.

Both have two elevated mountain masses separated by a valley, in which case two rivers flow, like the Neb and the Dhoo, in opposite directions ; in each case the northern is the more extensive range. Physically, therefore, they have a certain resemblance to each other.

Climatically, however, they differed, and a discussion on these differences is instructive.

Cos*—situated as it is at least 17° nearer the equator than Mona, or at a mean distance of about ten English miles south of lat. 37° N., and crossed at its southern end by 27° E. long.—has a higher mean annual temperature than the northern island, and, what is still more important, a greater range of mean annual temperature.

Cos lies within the January isotherm of 52° , and the July of $78\cdot5$, so that its mean annual temperature would be about $65\cdot2$ Fahr., and its mean annual range of temperature $26\cdot5$.

Now, the accepted mean annual temperature of Mona, subject, of course, to any corrections that may be found necessary hereafter, when the meteorology of the Island has been more thoroughly studied, is $49\cdot4$; its mean January and July temperatures respectively are $41\cdot4$ and $59\cdot8$, and its mean annual range of temperature, or the difference between these two last, is $18\cdot4$.†

If we now arrange these figures side by side, we shall perceive the contrast more distinctly—

Mean Annual Temperature :

Cos, $65\cdot2$; Mona, $49\cdot4$ —difference, $15\cdot8$.

Mean January Temperature :

Cos, $52\cdot0$; Mona, $41\cdot4$ —difference, $10\cdot6$.

Mean July Temperature :

Cos, $78\cdot5$; Mona, $59\cdot8$ —difference, $18\cdot7$.

Mean Annual Range of Temperature :

Cos, $26\cdot5$; Mona, $18\cdot4$ —difference, $8\cdot1$.

We thus see that the Isle of Man has an advantage

* Lies between $36^{\circ} 40' 10''$ and $36^{\circ} 55' 20''$ Lat. N., and $26^{\circ} 56' 40''$ and $27^{\circ} 23' 10''$ Long. E.

† According to Tables published in Mr. Alexander Buchan's paper on "The Temperature of the British Isles," Journal of the Scottish Meteorological Society; these were based upon the observations of the late lamented J. Surman, Esq., F.R.A.S., Ballasalla.

over the more southern resort in two important climatic features, namely :—a smaller range of temperature, and a less intense summer heat. And, with regard to the high temperature of the winter, we know that the winds that blow over the eastern part of the Mediterranean from almost every quarter have had to pass over extensive continents—Europe, Asia, and Africa—and, therefore, although the southerly winds may tend to raise the temperature of the winter months, yet these winds have not the benign marine character of ours, which, after blowing over the Atlantic and its encircling Gulf Stream, visit this Island with their healthful powers, undiminished by contact with continental land.

Still, undoubtedly, Cos was the best site that could be chosen, and was considered to have the best climate in those southern and land surrounded regions for the purposes to which its temple was devoted.

What the Asclepiads would have thought of Mona, I cannot say, but I believe they would have erected a temple here, and had they done so their records of cases would have been of incalculable use to the health seeker.

It should be remembered by those who seek the health resorts of the Mediterranean, that this sea is widely different, in its health giving properties, from the Atlantic with its Gulf Stream, and the great channels and seas which share its waters and encircle the British Isles.

Although the Mediterranean has often been said to be tideless, yet this is not the fact really; for we find that at the full and new moon its spring tides

rise to a maximum height of four feet at the New Mole, Gibraltar, and one and a half feet at Yafa on the coast of Syria, the mean for the seventeen stations in this inland sea being two feet and a quarter maximum height at spring tides, or $4\frac{1}{4}$ feet less than the lowest neap tides, which occur around our coasts, namely, Yarmouth, where the tide only rises to $6\frac{1}{2}$ feet.

This comparative tidelessness has an important effect in the neighbourhood of populous sea-side towns.

Compare this with what obtains on the coasts of this Island, where the rise at springs and neaps have a mean height of 19 and 14 feet respectively.

Then, again, the winds that come to our shores from nearly all points, have swept over some portion of the Gulf Stream, and imbibed with its moisture the stored sun-heat that it has brought from the tropics, whilst the air currents that impinge on the Mediterranean islands and peninsulas, have either travelled to them over the colder mountains of Europe, or the torrid plains of Africa, and have not had time to be modified by their passage over the comparatively narrow strip of sea which separates its southern from its northern coasts.

Besides which there are no currents in the Mediterranean to be compared with the Gulf Stream; those that do exist in it being dependent, for the most part, upon local winds.

Soon after the age of Hippocrates, when civilization was succeeded by luxury, the wealthy and idle sought change and recreation where nature had provided the means of enjoying hot springs.

From the time when Homer described the hot and the cold springs which gave rise to the Scamander, the former have always been sources of attraction among both the Greeks and the Romans, the latter of whom brought their taste for, and experience of, these warm fountains to the British Isles.

Lying, as the Mediterranean does, in the very axis of the volcanic chain of Europasia, which has a total length of 7,000 from the Azores in the West, through this sea to the Lake Baikal and the Altai Mountains, we cannot wonder that many hot springs existed, and, when discovered, formed the centres of what the ancients called "*Thermæ*."

Thus we find mention made of Alexandria Troas, visited by St. Paul and his friend the physician, St. Luke; the Baiaë of Roman renown, and the Aquæ Solis, or Waters of the Sun, at Bath. Many waters, too, both hot and cold, were characterized by the large quantity of minerals, such as iron, magnesium, and sodium salts in solution, and were found to be medicinally effective; hence the establishment of inland watering places, such as Bath, Tunbridge Wells, Harrogate, and many other places which were first called "watering places."

These places were not selected on account of the peculiar healthiness of their site and climate, but simply on account of the virtues of their medicinal springs; in fact the sea-side did not become resorted to to any great extent for health sake, until Dr. Russell, in his well-known "*Dissertation concerning the use of sea water in glandular complaints*," published in 1750, first attracted the notice

of invalids, and induced them to seek for relief in sea bathing at the then humble town of Brighton.

II.—THE FOUR PRIMARY REQUISITES: Sun, Air, Soil, and Water—The Essential Requisites to secure the full enjoyment of these: Aspect, Climate, Geology, and Water Supply.

The ancients had four elements, Earth, Air, Fire, and Water, which correspond with our primary requisites, the earth representing the soil, and the fire the sun.

A seaside health resort should be freely exposed to the sun, for nothing is more renovating than the *pure* rays of this source of light and heat.

The light and heat rays are both as stimulating to the animal as we know and see them to be to the vegetable system.

I emphasize the word *pure*, for much depends upon the way in which we receive the rays of the sun.

The drier the atmosphere the more intense is solar radiation; in fact it has been long explained by Faraday and others, that the moisture in the atmosphere acts as a sort of screen in consequence of the obstruction it affords to the passage of the sun's rays.

Hence even in a cold winter day we find, on the summit of the Yorkshire Chalk Wolds, to the south of Scarborough, or on the South Downs, to the north of Brighton, the sun not only hot but exhilarating and tonic.

Whereas if we descend into the red sandstone valleys of Devonshire, where moisture prevails, and

where the sun's rays have been robbed of these stimulating powers, and where the atmosphere has been warmed by contact with the ruddy absorbent soil, the effect will be found to be entirely different ; in the former instance we feel ourselves braced up and fit for anything, and in the latter relaxed and inclined for the *dolce far niente*.

The ancients were fully alive to these differences, and believed that the great ethnological contrasts between the dull Beotians, who lived in the " crass atmosphere " of the valley surrounded by mountains, and the bright native of Attica rejoicing in the dry and bracing air of its limestone heights. depended on them.

I may further illustrate this by recalling to your remembrance the difference between a stove-heated and fire-heated room.

The cheerful bright fire represents the unmitigated rays of the sun ; its heat and brightness both combine to produce agreeable sensations, although the atmosphere of the room may be still cool.

On the other hand, in the stove-heated room we have certainly an atmosphere heated by contact with the hot apparatus, like that of the Devonshire valley, but we miss the stimulus of the light and heat radiating from the coals, and, although warm, we are not altogether happy.

Still, whilst the bracing air of the mountain, with its stimulating sun, may give new life to some, it would not do for those whose complaints would find relief in the beautiful valleys of Devon.

Houses and streets should be so built as to secure on their opposite sides as much sunshine as possible.

It should be remembered that the sun does not always rise in the east and set in the west ; this only happens about the time of the Spring and Autumn equinoxes.

After the spring the sun gradually rises more to the north-east and sets more to the north-west ; whilst after the autumn it begins to rise more in the south-east and set more in the south-west.

Persons with delicate lungs should never occupy a bedroom from which the sun is shut out.

In winter, for these cases, bedrooms that have the afternoon sun should be preferred, and in the summer those that have the mid day rather than the too early morning or the too late evening sun.

Many persons suffer from the reflection of the sun from light surfaces, such as chalky roads, white houses, and light coloured pavements, when at the sea-side.

The glare is very distressing to many visitors ; on consulting the eminent optician, Mr. John Browning, of the Strand, London (whose admirable papers in *Knowledge* on "How to use the Eyes," should be read by all), he wrote to the following effect :—

"That frequenters of our south coast sea-side health resorts require neutral tint glasses, but," he adds, "briefly I find *blue* glasses the most beneficial, *violet* comes next, and *smoke* or *neutral tint* last. Many persons who read in rooms having a south aspect would do well to have spectacles made of coloured glass instead of the ordinary white glass. This would save their eyesight a great deal, and prevent distressing headache."

I hope these remarks will induce those who have the paving of promenades, and the colouring of houses, in our health resorts, to contrive some better colour than what is now too universally used. I would suggest that some colouring material, such as soot, should be well mixed with the concrete, so as to produce a *neutral tint*, and modify the glare that makes our coveted sunshine unpleasant.

There should be every chance of free ventilation of the whole town: it must be remembered that sea-side places are half valleys, and that under certain conditions of the atmosphere and during the prevalence of certain winds, if they are overshadowed by cliffs, they must suffer similarly to valleys and get their air becalmed when an "off shore" wind blows.

Persons who are susceptible of air stagnation should remember this in selecting lodgings and residences. Of course when the town is built, as Scarborough is, between one and two hundred feet above the level of the sea, this inconvenience is not so much felt; besides which the precipitous character of the cliffs break the force of the wind, and produce that peculiar climate so grateful to those suffering from lung affections.

Health resorts should never be situated in the mouth of a funnel-shaped valley, especially when the trend of the valley happens to coincide with the direction of the prevailing winds—only the strongest persons can stand such places, and health seekers do not belong to this class.

Around the coasts of England and Wales every variety of soil is to be found: as the different strata which characterise the geology of the United

Kingdom all more or less crop out at some part or other of the coast line.

It must be rembered that, so far as the actual soil of a health resort is concerned, the great thing to be dreaded is *dampness*, which naturally obtains when our retentive clayey and loamy soils are allowed to be built upon without thorough drainage.

This is entirely within man's power, and if he neglects to correct it somebody is sure to suffer—the landlord, at least, deserves to do so in his pocket.

Much rheumatism, much heart disease are the penalties for living in undrained and unventilated streets and houses.

I recollect finding a death rate from heart disease and the circulatory organs in a populous street equal to 47·4 to every 10,000 persons living, whilst that of the town was only 14·0. This led to thorough drainage, the first good effect of which was that the papers remained on the walls, which they did not do before.

No house or street should be allowed to be built until the foundation has been thoroughly drained and concreted; and a heavy penalty should be inflicted on the use of *sea sand* by builders, which has been the cause of more deaths from consumption, rheumatism, and other disease than is generally supposed.

Dr. Bowditch, in America, and Dr. Buchanan, in England, have shown how great an influence draining has on the death rate from consumption.

Water Supply.—Over the entrance of the old Pump-room in Bath, is inscribed in Greek the legend that “*Water is best,*” and this indicates the high

value our forefathers placed on this, one of the four natural essential requisites.

Without good water no place is habitable ; and without a good *constant* and abundant supply no sea-side town should take the rank of a health resort.

Good, of course, the supply must be, but its abundance must be *abundance without waste*.

To waste water has always been deprecated from time immemorial, especially in oriental nations, where a higher value has ever been set upon it than among western peoples.

A long, interesting, and instructive chapter could be written upon the many ways in which this inestimable gift of nature is wasted, but it would be out of place to discuss that here ; and, therefore, I shall only allude to it incidentally.

The enormous quantity of water supplied to ancient Rome has often been remarked upon ; for instance in the time of Trajan nine grand aqueducts, having a total length of 262 miles, supplied about 4,400 gallons per second, and this quantity was augmented to the extent of one fourth by canals subsequently constructed. Even now, although most of their ancient aqueducts, says Emile Reclus, are in ruins, the water supply of the capital of Italy is superior to that of most other cities. But, he adds, if the time should ever come when Rome will occupy the whole of the space within its walls, if ever the Forum should again become the centre of the city, then the want of water will be felt there as much as in most of the other great towns of Europe.

This is a note of warning to increasing towns.

To give an idea of the water supply of some

leading cities, in gallons, I will detail the following facts :—

Rome consumed in 1869 daily per each inhabitant, 208 gallons; Paris, 1875, 44; London, 1882, 28·6; Glasgow, 1874, 52; and Washington, 1870, 660.

With regard to the London consumption for 1882, I have just received the following :—

In 1882 there were consumed in London 141,269,997 gallons of water, of which 115,841,398 gallons were used for *domestic purposes*, and 25,428,599 for *other purposes*.

The total amount consumed daily was at the rate of 28·6 per head of population. “This quantity,” says Professor Frankland, in his report, “although abundant, shows that the water has been used with considerably more *economy* than during the previous years.”

The number of gallons used for *domestic purposes* daily to each house, was in 1881, 200; but with an increased population in 1882, it only amounted to 183, leaving in the latter year 40·1 gallons per house, to be used outside for other purposes.

Every well should be examined, and its water analyzed, and if found to be contaminated, the well should be closed, if it can be proved that the source of pollution is from sewage and other impurities. Where there is a public water supply, there should be no wells of a suspicious character allowed.

Water is not only essential to our health, but to our comfort.

In health resorts, especially during the summer season, when, from the sudden increase in the popu-

lation, a great strain is put upon the house drains and public sewers, there should be no stint in the supply, both for flushing the drains of every description, and for laying the dust.

Whilst, however, there should be no stint, there should be no waste.

In our changeable climate, and when we too well know how ignorant we are of the grander laws which regulate weather, we should be prepared for the worst, and every sea-side health resort should have a sufficient store to meet the exigencies caused by a long-continued drought; moreover, every sanitary authority should have the command of the public water supply.

III.—CIVIL REQUISITES.—“Old Towns”—Street Arrangement—The “Laurentian” or “Grid-iron” System—Overcrowding—“Black Spots”—Street Ventilation—Open Spaces—Improved Dwellings for the Poor—Hospitals—Schools—Hotels—Boarding and Lodging Houses—Smoke Nuisance—Land Drainage—Tree Planting—Pig and Cow Keeping—Scavenging, &c.

Many a sea-side resort of the present day owes its origin to some old fishing village, in some cases an old seaport has been converted into one; it matters not however, for in nearly all there remains the “old town” to tell the tale of its former origin, and to afford a contrast to the present grandeur of the “new town.”

Now in too many instances the antiquated streets and houses are built around and enclosed by

their more pretentious successors, those near the sea being generally demolished to give place to others, so as to shut out from view, the sunlight, and the sea air, the antiquated dwellings and narrow streets of the founders who gave the place "a local habitation and a name."

As time goes on the new town begins to grow, new residents, and an ever increasing number of visitors, demand fresh streets, houses, and hotels, until at last the poor old town becomes neglected, is stifled by its fine surroundings, and all the evil effects of its original defective street and house arrangements become intensified, so that at last it acts like a rotten core in the centre of an apparently beautiful fruit, and, like the leaven of all rottenness, at last taints everything that surrounds it.

*One has but to look down the list of health resorts and note their death rates, to discover where old towns are hidden. They are sure to set their mark on the inexorable figures of the death recorder, and sooner or later will taint the fairest reputation when they are neglected.

How many* popular places there are, along our English and Welsh coasts, that show a brave frontage of palatial houses and hotels, and have in their rear networks of squalid streets, and still more squalid houses, reeking with over-crowded rooms, and tainted with the pestilential emanations of unemptied middens, and ashpits, full of rottenness, where disease and death hold high festival, where in fact the death rate is between 50 and 60 per 1,000 annually.

Yet what do we see? Strange as it may appear,

we find those who have the care of the public health, going a-field to remedy the evil that is in their midst; we find them squandering thousands upon thousands in making parks for the people outside the town, so that the wretched denizen of their overshadowed streets and alleys may have a few hours' pure air on fine days, and then return to pass the remainder of the day and the wretched night in the sour stagnant atmosphere of the old town quarters.

This is beginning at the wrong end. The old town quarter is the locality that demands the first and instant attention of the authorities, and parks and fine streets should be left until there is no cause for fear remaining in the "black spot" area.

In the first place the old town should never be enclosed; it is the grandest mistake that those who have the planning of new streets can make; but when the error has been committed, then, indeed, does the pounded town demand the utmost watchfulness. It must be remembered that by excluding the fresh air from the old streets and houses they are at once deprived of the very source of health which originally gave the site a reputation for healthfulness, and which first made it a health resort.

The peril which lies hidden in these black spots admits of no trifling; the danger should be met at once; a thorough house to house visitation should be made; the census of the streets should be taken; the death rates in them be ascertained; the most fatal houses examined; and, after all this and much more has been done, plans and sections of the sites

should be made and means taken at once to sweep away the causes which are creating trouble.

The denser the population the greater the death rate, may be taken as an aphorism. Overcrowding must be met with a strong hand, and provision made for the surplus population by the erection of improved dwellings elsewhere. When this has been done then the condemned houses and streets should be pulled down and rebuilt on the most improved system.

The old streets should be widened and repaved, and whenever an open space can be formed, and inlets from the sea be made, these things should be done; even if many of the palatial but obnoxious buildings which impede ventilation should require to be sacrificed; every *cul de sac* or blind alley should be converted into a thoroughfare, and the new streets so arranged that they shall freely admit the prevailing winds of the locality.

The drains of every house should be so disconnected from the sewers as to intercept the admission of sewer gas; a system of scavenging should be sedulously carried out; the water-cart should, at frequent intervals, especially during the summer months, be employed with hose adapted for flushing every house drain with a good volume of water; the streets and alleys should be well laid down with either concrete or asphalt, so that rain and other water shall have no chance of settling.

The houses should be thoroughly repaired and white limed, and a strict watch kept lest overcrowding occur.

Landlords who neglect to keep the structural

parts of their property in good repair should be reported and punished ; in fact, I believe a large number of the proprietors of houses that are to be met with in the " black spots " will not be brought to a sense of their duty until a system of licensing houses for habitation is carried out.

A licensed victualler who is found keeping a disorderly house has his licence forfeited ; a job-master who lets out a vicious horse, knowing it to be so, is punishable for any damage the animal may do.

I hold, therefore, that it would be only fair and just that a landlord, who owns a dangerous house, should not be allowed to let it until he can show a certificate that it has been made not only legally but safely habitable.

This certificate system should be extended to all houses that are open at all times to the public.

Remember that the death rate of a sea-side health resort, and of every other town, is influenced by its street arrangement, and by the sanitary condition of its houses.

When these are defective the best and healthiest site in England can be made a hot-bed of disease ; on the other hand, when they are perfect, the worst site can be made healthy.

Of course the immediate responsibility for these " black spots " rests entirely upon the sanitary authority, and they cannot relieve themselves of it, where, as in England, they have the most ample powers to cope with them ; moreover, if they allow them to remain after they become aware of their existence, all I can say is that they are not only

responsible for the black spots themselves, but for the sickness and the deaths they cause.

There is a difficulty, no doubt, but it is only one of those difficulties that are sure to arise when men are appointed to sit in judgment on their own actions, and will only disappear when such anomalous tribunals cease to disgrace the administration of the laws for protecting the public health.

Many years ago, when Boards of Guardians in England were first entrusted with the care of the public health, I constructed a map showing the *fever haunts* over an area of a thousand square miles, within which was one manufacturing town, twelve market towns, and over three hundred villages with a population of more than a quarter of a million.

This map, which was made on the same principle as my other disease maps, struck everybody as being an excellent mode of showing all the places that wanted special looking after ; in fact every one was pleased with the way in which I had shown the distribution of the fevers.

But when I informed these admirers of my intention to construct a companion map representing the geographical distribution of bad landlords, who had been at the bottom of this disease, a visible change came over the scene ; for some of these very landlords were then sitting in solemn judgment on some poor tenant who could not keep from creating a nuisance in consequence of his landlord's delinquencies.

But it is not in the old towns alone that we have to contend with serious defects in the construction of houses and in street arrangement.

Of late years, ever since in fact the introduction of that clumsy expedient for the disposal of sewage, the water carriage system, was first introduced, house builders and drain layers have exercised all their ingenuity to make our houses pestiferous by the introduction of sewer gases into them.

The medical profession has tried its utmost in England to expose the work of these people and none more successfully than Mr T. Pridgin Teale,* of Leeds, whose work, profusely illustrated, should be read by every one who values the health of himself and family.

The only true safeguard against the perils arising from sewers is the adoption of the intercepting plans by which the house is entirely severed from the public drains so far as the gases are concerned.

This is done by means of a shaft which not only acts as a man-hole for the examination of the drains, but cuts off all communications between the sewer and the house drains.

The simplest is what is known as Kenon's Air Chamber Floor, manufactured by Doulton & Co.

At Scarborough, the eminent medical officer of health, Dr. J. W. Taylor, D.Sc., has made his house a model in drainage for the whole town, a description of which will be left for the use of the town with plans and diagrams. The result is, that when the simplicity of this effectual safeguard is once understood, people only wonder how they could have allowed themselves to be poisoned so long.

During the last few years, since sea-side resorts

* "Dangers to Health." A Pictorial Guide to Domestic Sanitary Defects, by T. Pridgin Teale, M.A., F.R.C.S., Surgeon to the General Infirmary at Leeds. Churchill, London—Charles Goodall, Leeds.

have been so much the rage, these places have become the victims of speculators of all kinds. The building speculator is the one, however, who does the most mischief.

In the first place, where there are no bye-laws to obstruct him, he runs up houses in any fashion he likes, using sea-sand for cheapness, thus rendering them permanently damp; he calls in his friend, the drain layer, who, with his traps and other delusions, makes him believe that every thing has been done that can be done, and so on. Which means that he has placed the main sewer in thorough communication with the interior of the house, so that the cook and scullery maid, at their respective sinks would soon be able to give a certificate to that effect, as well as those who use the bath-room, the waste pipe of which will be found quite as capable of conveying foul air upwards as it is efficient in carrying dirty water downwards.

Those who use the water in chamber water bottles will soon discover that the cisterns which supply the water also supply other places, and, as that is not sufficient, the waste pipe of the cistern is made to establish a direct communication with the sewer below. The soil pipe has been built inside the house instead of outside, it has no ventilator of the same diameter as itself carried up above the roof, in fact everything "has been done that can be done" to ensure the poisoning of the tenants by sewer gases.

The poor tenant never dreaming that the constant ailments of himself and children are all ascribable to the sewer gas—the attacks of sore throats—relaxed

throats—neuralgia—headaches—diarrhoea—want of appetite—shivering, generally ascribed to colds—periodical sneezings, and other disturbances too numerous to mention, are supposed to be all due to the constitutional peculiarities of those affected, or to colds, whilst in fact they have been all brought about by sewer gas poison, which, although strong enough for these results, yet may not be actually capable of causing typhoid or other fevers ; which, of course, will be the next thing to be expected unless active measures are taken.

The sanitary authorities should urge upon the proprietors of all present houses to at once adopt the intercepting system, and to make byelaws whereby it shall be compulsory for all future houses to be constructed on the intercepting and ventilating principle as regards the sewers and house drains.

They should have an approved plan or model so that those employed should have no difficulty in carrying out details so necessary to success in these matters.

All hospitals, schools, boarding and lodging houses, hotels should at once adopt this system, as I know the time is coming when the first question a visitor will ask is not what the [prices are, but whether they are to be insured against poisoning as whole families have been both at home and abroad, but especially abroad ; however, there are many places in England that require security against this, and it is better not to point at one's neighbours until our own evils are remedied.

There are many places in England on the coast and inland that plumed themselves on being so much

better than their neighbour in the South of France, Cannes, when they read the article in *The Times* about it, in which it was stated that its death rate was 37 per 1000, but before they are entitled to indulge in such charitable feelings they should be able to show a clean bill of health themselves, and prove that their death rate has not been served, like some accounts have been, namely, "cooked."

I have only time to give you one instance of this "cooking" process: whilst investigating the distribution of diseases in a certain part of England, I came across a straggling little village, with an interesting ecclesiastical building in it, which was the object of my visit, and accidentally met the local Registrar of Deaths, from whom I subsequently found that the death rate of his sub-district was over 26 per 1,000, which he explained was caused by the Union House for the whole district being situated in the parish, and that the two neighbouring seaside health resorts contrived to find out who were likely to die among the poor, so as to send them off to the Union House before they did so, thus saving the registration of the deaths within the limits of these health resorts; the death rates in which were by these means materially diminished, and as such published in the Medical and other Journals.

All these petty devices to delude the public will, I hope, soon be impossible, by the publication of maps of towns showing the "black spot" areas wherever they exist.

In the second place, speculators, and others who are foolish enough to be guided by them, care only to cover the ground they can lay their hands

upon with as much rentable material as they can pack upon it, knowing well they can let their houses before they are finished, and that they will be occupied before they are dry.

All this the sanitary authorities can put a stop to, provided that persons interested in such speculations are excluded from the Board.

Every sanitary authority should have a well constructed model or contour map of the whole area over which their jurisdiction extends.

They should know what diseases are prevalent or thrive in their district, and what diseases are rare; and they should act upon this information, and that derived from their *local* meteorological observations, and carefully construct a plan for all future streets, squares, and houses in accordance with what is known relative to the influence of physical geography and climate on these diseases. Such models, maps, and plans if once carefully constructed will remain of infinite service not only to the sanitary authority themselves, but to their officers, resident medical practitioners, and others of that profession who want information for the sake of their patients whom they are advising to seek the advantages of a health resort.

I think such a system will commend itself to all who have now thought seriously of the risks people run when ill, and requiring change, on going to a strange place about which they may actually know nothing.

Referring back to the street arrangement of speculating builders, of late years a plan has been adopted of packing streets in parallel lines, flanked

by streets at both ends, so as utterly to preclude the possibility of street or house ventilation.

On the map they look like enormous gridirons ; in fact, I have designated this wretched innovation as the "Laurentian" or "Gridiron" system.

Some of you will remember that the 11th August, the day on which the Dog Days end, is dedicated to St. Laurence, the martyr, who suffered at Rome, under Valerian, by being broiled to death on a gridiron. In London the Church of St. Laurence, Jewry, is dedicated to him, and has a *gridiron* on the steeple for a vane. Philip II. of Spain, having won the battle of St. Quintin upon this day, built the Escorial Palace, near Madrid, in the form of a *gridiron* in honour of St. Laurence. The building is the largest palace in Europe, and covers several acres of ground. The courts form the *bars*, having the residential buildings between them, whilst the residence of the Royal family represents the *handle*!

Now, we do not want to take a leaf out of Spain's book of Sanitary Regulations, since for the ten years 1861-70 (the last records we have), it could not keep its death rate below 29·7 per thousand, nor yet from its capital, where the mortality exceeded this.

What I wish to impress upon all sanitary authorities is the necessity of putting a stop to the chance of Christians and others being unwittingly subjected to the martyrdom which the *gridiron* system of streets will assuredly inflict, in the form of rheumatism, heart disease, and all other diseases, which are either caused or aggravated by want of ventilation, and proper air flushing, the only means

by which streets, alleys, and houses can be purged of their air sewage.

The artificial *calms* that are produced by the arrangement just discussed are fraught with mischief, and this was forcibly brought to my mind whilst investigating the distribution of rheumatism and heart disease in England and Wales, when I discovered how even *natural calms* caused and intensified diseases.

In the lecture which I was requested to give at Brighton last year (when that town was suffering from attacks on its sanitary condition), and which was published by the Corporation soon after, you will see the following remarks. (Page 5, "Brighton as a Health Resort": Beale & Co., Brighton.)

"The pent up valleys in some of the loveliest
 " spots in England are never thoroughly flushed of
 " their air sewage, in fact never thoroughly ven-
 " tilated ; the consequence being that they are often
 " cold, damp, and filled with the air of vegetable
 " decomposition, whilst the heights which wall them
 " in are warm, dry, fine, bracing, and full of health.
 " Frosts affect potatoes and fruit more frequently in
 " the dewy calm air of a valley bottom than they do on
 " the heights above, where the air is constantly
 " changed. In such valleys man contracts rheuma-
 " tism, the basis of the national heart disease, and
 " what is of equal importance to know is, that in
 " such valleys all diseases of the zymotic class linger
 " the longest and assume the most aggravated form.
 " The rheumatic and fever miasms hang about the
 " still air of the valleys, and as it were grow in
 " strength with the accumulation of air sewage."

What is true of natural valleys, is true of streets where ventilation is obstructed.

Those only can thoroughly realise how want of street ventilation, and a calm condition of the atmosphere intensify diseases of every kind, and especially during epidemics, who have done the work of attending the sick and dying during such terrible visitations as those of the cholera.

In 1849 I had the sole medical charge of a town in the west of England when this disease visited it in that year.

For two months I undertook to attend all the cholera cases, whether paupers or not, that occurred in this borough of less than 12,000 inhabitants.

The epidemic lasted nearly four months, and during that time there were over 250 deaths from cholera and choleraic diarrhoea; so that the deaths from these causes alone were equal to an annual rate of over 60 per thousand (62·4).

The year 1848 is memorable meteorologically from the fact that Schönbein first made known how the presence of *ozone* can be detected in the air by means of slips of white blotting paper saturated with a solution of potassium-iodide and starch.

In England I was one of the first to join his corps of observers, and I recollect well what an impression the results of my observations made upon me when I compared them with the register of fresh cases of cholera.

I found that whenever calms were present there was at once an increase in the number of cases and an absence of any sign indicating ozone in the atmosphere.

On the other hand, whenever the air was disturbed by equatorial currents, the test papers began to turn brown (thus indicating ozone), and the number of fresh cases to diminish.

My late lamented friend, Dr. William Farr, C.B., F.R.S., D.C.L., &c., the father of sanitary science, and whose place in the General Register Office can never again be filled, on comparing the mortality from cholera in London with the meteorological observations of Mr. Glaisher, F.R.S., found that during "calms" this disease was always intensified, as evidenced by the greater mortality from it.

What is true of cholera is true of every other disease, and especially of those of an infectious and contagious character, such as typhoid fever and other causes of death called zymotic.

Nature is said to abhor a *vacuum* ; but not more than Hygieia dreads a *calm*.

You can understand then why those who have had any experience of the public health are so intolerant of any artificial arrangement, whether of streets or otherwise, which have a tendency to create *artificial calms*, or, in other words, to encourage this stagnation of foul air in places where nature has provided ample means for thorough ventilation and the clearance of air sewage.

Before leaving this part of my subject, I must impress upon all the necessity of providing public *slaughter-houses* outside the town.

Pigs and cows should not be allowed to be kept in the midst of human habitations ; and every public means employed to prevent not only the houses but the

steamers in the harbour from filling the air with smoke, that can be, and ought to be made to be, consumed.

It is noteworthy that all the districts where cultivation of the soil is carried to the greatest perfection, are as a rule the healthiest ; and for this reason alone, even if for no other, all swamps and flats, which now produce only aquatic plants, should be *drained*, for it has been proved that by so doing the actual climate is improved, and the mean annual temperature of the locality heightened.

All public sewers should be thoroughly ventilated by shafts carried up the ends of houses, high above the roofs, wherever practicable, especially where they are what are called "blind" or "stop ends."

Trees are great modifiers of climate, preventing the chilliness of valleys and reducing in them the number of frosts. Of all trees, that I would advise being cultivated are the coniferous or the pine and fir tribes, not only for protection but for the absolute curative power of their emanations, especially in consumptive cases.

IV.—DUTIES OF THE RESIDENTS AND HEALTH BOARDS.—Notification of the existence of Infectious Diseases—Registration of Births and Deaths—Death Rates—Census of Visitors—Sea Side "Seasons"—House-airing during the winter.

Every resident in a health resort should consider himself a host about to receive a guest ; and as such take such measures as shall effectually conduce to

the comfort and health of those who have been invited to sojourn with him.

With his fellow townsmen he should do his utmost to beautify and cleanse his town, and at the same time provide recreation for the mind and body during the temporary absence of visitors from their homes for health sake.

Amongst one of the most important provisions, which residents have to carry out, is that which shall guard their visitors against the dangers arising from infectious diseases ; for it has been proved over and over again that fresh comers, and especially those weakened by over fatigue or ill-health, are always more susceptible to infection on arriving at a fresh residence, should it exist, than those who have, as it were, become acclimatized to it.

To carry out, therefore, this most important act of hospitality, it is absolutely necessary that the notification of the existence of every disease of this kind in a family should be made compulsory by the Sanitary Board with the hearty co-operation of all who are interested in the welfare of their town and the safety of their visitors.

It should be enacted that, in every case of sickness arising from infectious diseases, the medical attendant so soon as he has formed his opinion of the nature of the case, shall hand to the head of the family or the person in charge, the name, address, and disease of his patient, signed and dated, after which it shall devolve upon such person to forward without delay to the Sanitary Board the notification in order that they may take such steps as may be deemed necessary to prevent the spread of the disease.

Defaulters in this respect should be punished, as they not only endanger the lives of their own families, but those of their neighbours, and thus jeopardise the reputation of their town.

This system is satisfactorily pursued by the Southport Sanitary Authority, and is practically carried out voluntarily at Scarborough with the most excellent results.

The annual, quarterly, and weekly reports of the Registrar of Births, Deaths, and Marriages should be regarded as the most interesting publication issuing from the Press, instead of its being looked upon with fear and trembling.

Every person having the welfare of his town at heart, whether from a commercial or sanitary point of view, should help the Registrar in making it as complete as possible.

It is important that information should be obtained on the following points, whenever a death is registered :—

1. Whether a proper medical or coroner's certificate has been given as to the cause of death ; and if none has been given, the question should be promptly decided as to the advisability of holding an inquest on the body—the only alternative, I believe, for securing proper civil registration.

It must be remembered that the whole community is interested in efficient registration, for a seaside health resort may suffer greatly in its reputation if the printed and published reports show a preponderance of any diseases, which have been ascribed by local registrars as having been the causes of death on the mere representation of relatives

totally ignorant of the true causes without medical opinion. For instance, how many lingering diseases, as well as sudden deaths, are ascribed to "consumption" and "heart disease," without either the advantage of medical advice, or the authority of medical opinion.

I speak from long years of experience ; for my study of the geographical distribution of disease has rendered it necessary for me to search well the death returns in the United Kingdom, and I know from experience how large a proportion of deaths* are uncertified.

2. The native place of every resident in a district, as well as the length of residence in the place where the death took place, should be noted, and the same plan should be adopted for visitors. This would throw great light upon many points, which would help not only the Registrar-General but the local medical men in deciding whether the diseases were brought with the deceased or contracted in their new abode. Similar information should be obtained about visitors, and especial note should be made whether they were afflicted with the disease that killed them when they arrived.

3. With regard to deaths by drowning, by which the total number of deaths is often swelled in seaside places, care should be taken to trace all deaths of residents from this cause abroad, for *all* the deaths from such accidents to visitors are bound to be registered ; this would obviate the manifestly unjust mode of dealing with this cause of death on "the

* In 1881 the proportion of uncertified deaths in England and Wales was 4·1 per cent. In the Metropolis, 1·3 ; in Huntingdonshire, 6·7 ; in Cornwall, 7·0 ; in Durham, 7·3 ; in Hereford, 7·5 ; and in Wales, 11·0 per cent.

give and take " principle : for it may so happen that very few of the inhabitants of a sea-side resort may be drowned in consequence of their occupation abroad ; whilst many bodies may be thrown on its beach within the jurisdiction of the local registers.

4. The Sanitary Board should be supplied weekly, or as often as any infectious disease occurs, with a copy of the register of deaths, for the sake of at once taking such steps as may be necessary to prevent its spreading. A good-sized map, whereon are laid down all the houses, streets, alleys, &c., should be suspended at their office, on which every death that takes place should be noted : so that the distribution of epidemics and other diseases should be seen at a glance, and the " black spots " kept constantly before the proper authorities, and the causes of their high mortality daily searched for.

It will then very soon appear to the residents how great an interest they should have in the *Death Rate* of their town ; they would gradually become educated in its causes, and not look upon it as a thing beyond their grasp ; and they would soon find how much each individual can do towards lessening it by keeping the causes of its increase constantly before his eyes.

It should create as much interest as the weather, —more in fact— for it is greatly under their control, which the weather is not.

They will have to look upon those who, whether as landlords or as tenants, conduce to raise the disease or death rate as bad citizens, and punish them by inflicting disqualifications on them for any of the honourable offices in their community.

In every sea-side resort there should, during the seasons, be a census taken of the visitors ; the great increase of a population during the warm weather of the year, when putrefaction and other changes in animal and vegetable matter are most active, a special strain is put upon the resources of the sanitary authorities, and the utmost vigilance is required to prevent overcrowding and the accumulation of filth in every variety. Moreover, the dangers of disease importation are great, for sea-side health resorts are very recklessly treated by visitors, who too often leave their homes during convalescence, bringing with them their infected bodies and their undisinfected clothes.

At this time all the precautions I have just indicated should be redoubled.

The census of visitors will enable the sanitary authorities to take a mean of the "seasonal" population and adjust the death rate accordingly. I have advised that the number of visitors should be taken (at what is considered the height of the season) according to sex, and that these should be divided into persons under and above 15 years.

In Scarborough, last year, the visitors' census was taken on Saturday night, the 26th of August, and it was found by the returns delivered on the following Monday that there were 30,071 residents and 16,462 visitors. The localities from which the latter came should be noted, as it would be useful knowledge in many ways, especially in the tracing of infectious diseases.

With regard to what are called the "seasons" at health resorts, I think, when the climates and the

disease distribution o different places are better known—which can only be done by a more complete arrangement of meteorological stations, and a further study of the natural history of disease—that great changes in this respect will take place. Take, for instance, your own Island : how much those who do not know it lose by not seeing and enjoying its lovely scenery during the “ leafy month of June.”

Again, there is Scarborough, with its mild, warm, westerly and south-westerly winds during the winter months, precluded, from a want of a proper knowledge of its climate by the public, from enjoying a winter season, simply because, like your Island, it is a few degrees further north than the south coast.

The public do not seem to know that the insular character of the one and the peninsular site of the other, give them exceptional advantages which override latitude.

Whilst on the subject of winter seasons, I wish to remark that all persons who expect visitors in the early part of the summer season should be careful to keep their houses well aired during the winter when they are unoccupied. In the first place, there should be no bedroom without a fireplace, and throughout the winter a fire should be lighted and kept up during the whole day for at least one day in the week in the unoccupied rooms, each room being taken in rotation.

If this be neglected it is difficult to get the cold out of the walls and articles of furniture, until far into the summer, the consequence being that first visitors often complain of the chilliness of the rooms in returning from walks, which as well as the colds

they get they naturally ascribe to the climates of the place. This should not be, for the climates of our houses are certainly under our control here as well as they are in Russia.

At Scarborough, by the advice of their excellent Medical Officer of Health, Dr. John W. Taylor, D.Sc., the Sanitary Authority have instituted a system of "*House Inspection*," which I will briefly describe. By permission of the occupier, the Inspector visits all houses, making notes of any sanitary defects. The result of his inspection is entered in a Sanitary Register, kept at the Town Hall.

The defects and their remedies are pointed out to the occupier of the house, and as soon as all is put right the house is revisited and a certificate granted by the Sanitary Authority that the house in question is, as far as can be ascertained, in a good sanitary condition.

The drains are tested, and every available means used to obtain the information required. The hotels, boarding, and lodging houses are subjected to exactly the same inspection, so that if any preventible disease breaks out in any house the register is immediately referred to, with the view of ascertaining whether the house has a certificate or not, and whether the recommendations for its sanitary improvements have been properly carried out.

I can testify, having investigated thoroughly and reported on the sanitary condition of Scarborough, so lately as last year, that the system works admirably, and that the people are thankful for so much interest being taken in their sanitary comfort and security.

V.—THE REQUIREMENTS OF THE HEALTH SEEKER.

Selection of Resorts according to their fitness for certain Diseases — Recreations — The Necessity for Museums and Public Libraries— Winter Gardens.

The site, geographical position, and aspect of a health resort are all points that require careful study.

Before, however, discussing them I wish to prepare you for the special mode in which I consider these characters ought to be examined.

In the first place you must always bear in mind, when disease, or over-fatigue of mind or body renders a health resort necessary, that all the vital powers of the body are depressed more or less, if not weakened.

In the second, that when the body is so depressed or weakened, it has less power of resistance, when opposed to obnoxious influences; such as extremes of heat and cold; the extreme force of the wind and the still more dangerous calm; the excessive humidity and parching dryness of the atmosphere; the too great brilliancy of sunlight and its prolonged absence; the too great radiating, and the too great absorbing power, whether of light or heat, of the soil; malarious emanations of all kinds, whether they arise from ill-drained land, a sewer, or an overcrowded room; or draughts, whether through an open window or a street corner.

In the third it must never be forgotten that there are few amongst us who have not at least one organ weaker than the others— one organ that, when it has a chance, will prove a trouble; and that

such an organ, unfortunately, seems to be always on the alert.

It may be that the disease, which sends a health-seeker to a health resort, does not affect for the time this weak link in the chain of his mortal coil; he has it within him nevertheless, and in the selection of a place wherein to recruit his shattered health, he will be bound to consider first what places to avoid, lest, by neglecting this all important provision, he may heedlessly run the risk of selecting one where the surroundings are such as to evoke the latent mischief, which either lurks within him hereditarily, or has been implanted in him by accident, habits, or occupation.

For these reasons the selection of a health resort is not the easy matter that now-a-days most people seem to think it.

It certainly is not a matter that can be treated in an off hand manner by the medical man when consulted by a patient.

I will digress for a moment in order to place what I wish to impress upon you in as practical and forcible a light as possible.

It is known to most of you that there are certain localities in England, which from time immemorial have had the ill-fame of producing the disease called *ague*, or intermittent fever.

Many of these places have had their power destroyed by drainage and cultivation; there are many left, however, which still keep this cause of death on the Registrar-General's long list of diseases; it certainly is not now, thanks to quinine, a very fatal disease, although a most distressing one.

In 1881 it destroyed in England and Wales 62 males and 51 females, 113 in all, the average for the last five years (1877-81) being 117, whilst that of the quinquennial period (1857-61) it was 197.

The reduction in the prevalence of this disease affords strong evidence of man's power over local climate when he chooses to exert it.

If we take the thirty years, 1850-79, the death rate from this malarious disease in England, for the three successive decennial periods, will be found to have been as follows:—During 1850-1859 the mean annual rate of mortality from this cause to every 1,000,000 persons living was 9·4; during 1860-1869 it was 6·3; and during 1870-1879, 4·8.

This decreasing rate seems to continue, for I find that during the last two years, 1880-1881, it only reached 4·0.

We may safely say, then, that a disease which was once exceedingly prevalent in England, has been made scarce by draining the marsh and other *low* lands which once produced its poison in large quantities.

Let me give you another illustration as a companion picture to the one I have already drawn.

In 1869 I first showed to the Medical Society of London that *cancer* amongst females had a well pronounced geographical distribution in England and Wales, and that it prevailed principally in those riparial districts of English rivers which are seasonally subject to floods after much rain.

In fact, I proved that if you took a brush and coloured all the districts on a map of England *blue* that would be flooded after a week's heavy rain,

you would mark out all the districts having an excessive mortality from cancer.

This important fact I had worked out from the returns of 42,137 death of females which had occurred during 1851-1860 in the 625 registration districts into which England and Wales are divided.

We all know that for the last twenty-five years, the upland farms in England have been drained to an enormous extent ; the result being that, whenever heavy rains occur, the water is carried off from the land so quickly that the rivers, obstructed as they are by water-mills, antiquated bridges, bad farming, and general stupidity, are unable to drain the waters away fast enough ; they, therefore, tail back, accumulate, and flood, destroying property, health, and life ; promoting the development and propagation of the fluke in sheep, and innumerable diseases in cattle ; and conducing to the production of certain local climatic conditions, which are coincident with, if not the cause of, the prevalence of many grievous diseases amongst men, one of which is *cancer*—at once the most terrible and incurable of diseases.

Now, has this disease increased with the floods ?

To answer this question, I will take the same thirty years that served us for ague.

During the ten years, 1850-1859, the mean annual rate of mortality from cancer to every one million persons living was 314·8 ; during the next ten years, 1860-1869, 386·5 ; and during the last ten of the decennium of this period, 1870-1879, 467·5.

This fearful increase seems still to grow and keep pace with the flooding of the country, for we find that the annual death-rate for the last two years has

amounted to 517·8, which amounts to an annual death-rate of 203·0 from this cause in excess of what obtained thirty years ago, before our rivers were overwhelmed by ignorant improvidence and obstructed by stupidity and selfishness.

Thus while we snatch by the draining of the *lowlands* 4·6 lives from ague per million per annum, we lose 203·0 from cancer by the drainage of our *uplands*!

There are two other diseases which demand our especial attention, for two reasons. First, because they are unfortunately exceedingly prevalent and fatal; and secondly, because they are much dependent on the character of site for their development.

I allude to *consumption* and *heart disease*.

In 1871 there were 4,259,032 inhabited houses in England and Wales, and during that year there died 53,376 persons from consumption, and 23,628 were registered as having died from heart disease.

There was, therefore, one death from consumption to every 80 houses (79·7), and one to every 180 houses (180·2) from heart disease during that year.

Facts sufficient in themselves to prove how these two diseases permeate the community at large, and how large a contingent of persons and their families, so diseased, must flock to health resorts, either for health or education's sake.

The house, the home, is the natural unit to which all our studies in disease geography must tend.

We begin with a whole country, and after examining the relative prevalence of any cause of death in its divisions, counties, districts, sub-districts,

parishes, and streets, we finally enter the very homes of those in whose health we are interested, and there search for the causes of death and disease which were foreshadowed at the very outset of this inquiry, when we first ascertained the actual death rate of the entire country.

I will endeavour to impress this upon you by illustrating it with a fact taken from a very large number that I have gathered since I first began this inquiry, now more than fifteen years ago.

In 1881, England had a death rate from *all causes* of 18·9 to every 1,000 persons living, which, as the Registrar-General remarks, was no less than seven per cent. lower than the lowest recorded in any previous year since civil registration began.

One of the eleven divisions had a death rate of 15·8.

In this division there was a county that had one of 15·6.

In this county there was a registration district where the annual rate of mortality was 16·4. This district consisted of three parishes, one of which had a death rate of 13·0 ; a second, one of 14·09 ; and a third, one of 22·1.

The third parish consisted of the old part of the town, separated from the sea by the two new parishes.

In this third and oldest parish there were streets having a death rate of 30·00 per 1,000 per annum.

From the street we go to the houses, and thus hunt disease and its causes to its own lair.

This is far from an extreme case.

I know an instance in which the mortality rose

to 52·4 in a street in a sea-side health resort, and this not from zymotic diseases.

In fact I have learnt to know that a great deal too much stress is laid upon the significance of the prevalence of this class of diseases. There are other diseases much more certain, and more delicate, as tests of the presence of the persistent causes of diseases in a locality.

Zymotic diseases are not always present in the worst localities ; the other diseases are.

They are the barometers of the death rate, and like the barometers we use to warn us of the coming storm, their indications keep us upon the alert, for we have them always by us to consult. They are not like the fitful infectious diseases which come upon us without a moment's warning, too frequently unprepared, simply because we have not attended to the fluctuation of the more constant and ever present diseases, which are our best and truest guides.

The barometer is of little or no use to us during a storm ; we have then only to deal with the grim fact, and weather it as best we may.

What we want is an ever ready instrument, capable of giving us accurate information, every moment we consult it, of what is really the condition as regards pressure of the atmosphere around us ; so that we may note the very first indications of the impending storm, and steer our ship accordingly.

Now, our atmospheric storms and our disease storms differ in this respect : the former are *inevitable*, but may be provided against to a certain extent ; the latter, however, are *not inevitable* ; we have a certain command over them, and in many in-

stances—nay, almost in all instances—they can, not only be prevented, but, when this cannot be fully accomplished, their violence can be so tempered as to reduce their effects to almost innocuousness.

In England every sanitary authority can be supplied with a copy of the register of births and deaths of a district or sub-district either weekly or daily if required, as in large towns; and this enables those in charge of the public health to see exactly what is going on.

The medical profession is now trying to obtain compulsory powers for sanitary authorities to enforce the immediate notification of the presence of infectious diseases by the heads of families: so that the system of smuggling and misnaming diseases will become punishable offences.

I recollect having to investigate a frightful outbreak of malignant scarlet fever, which resulted in the death of nine persons, in a small community of less than 3,000 persons, entirely caused by the first case of the outbreak being called “measles,” a disease that was not so likely to interfere with the business of the inn-keeper whose family was first attacked, and from which centre the disease spread.

If, however, these copies of the death registers are only used by sanitary authorities for the sake of the indications of the presence of infectious diseases, or for compiling page after page of statistics for annual reports, known as “dust collectors,” I fear that it will be a long time before the natural history of disease in the British Isles will be written, or the constants of high death rates dislodged from their haunts.

These death returns, for many years past, as I have before indicated, I have made use of in my endeavour to solve the difficult problem of disease distribution.

During my inquiry the late Registrar-General, Major Graham; Dr. Farr, and William Clode, Esq., Secretary to the General Register Office, afforded me every facility for pursuing my investigations at Somerset House, as they were from the first fully alive to the importance of the inquiry and its results. By a system of mapping in shades of different colours, red and blue, I have been enabled to show in a map of England and Wales all those localities where certain diseases either prevailed or were scarce.

This plan at once appeals to the eye, making a lasting impression not easily forgotten by those who are interested.

Figures are soon forgotten ; besides, figures by themselves without the explanatory surroundings are of little use in the long run.

By these maps I have shown where diseases of the heart and circulatory organs, rheumatism, consumption, cancer, fever, &c., thrive, that is, where they are to be met with in the greatest proportion among the inhabitants. I have sought out the reason of their prevalence, whether dependent upon social, climatal, geological, physiographical, ethnographical, or any other causes, and by such means have I been able to form health guide maps so far as certain diseases are concerned for England and Wales.

Now, referring to what I said at the beginning of this part of my lecture, it will be easy to see that

such knowledge as these maps give must be of infinite service to the health seeker.

For instance, if consumptive, whether hereditarily so or not, it certainly would not be wise of him to select a health resort on the English or Welsh coasts where this disease is shown to be prevalent among the natives, for he may rest assured that there is some climatic element existing there which would be adverse to his weak organ.

He should rather select a locality where the map tells him that not only do the natives not die there in large proportions, but that the young, who, unfortunately, are tainted with this disease, have a chance of living over the critical age when this disease is wont to show itself, and of at last overcoming their lung trouble altogether.

Neither should the rheumatic or those affected with heart disease select—either for their residence or temporary sojourn for health's sake—localities where, from imperfect air flushing, these diseases prevail.

Again, those who are unfortunately heirs to a cancerous taint should not select a low-lying flooded district where it has been proved the climate is such as to foster rather than prevent the development of this terrible disease.

For these reasons it behoves all who are searching for health themselves or for their families, or who are anxious, for educational as well as for health purposes, to avoid placing their children at schools by the sea, or elsewhere, where they have a chance of aggravating instead of ameliorating their tendencies to certain diseases.

Now, it is of the utmost importance that all interested in the welfare of the young should carefully study what the nature is of their special health requirements.

A haphazard selection of a health resort, or a school, or a situation, may be fraught with danger and entail much misery.

Every health resort should be thoroughly studied as to whom it will and will not benefit. The medical men in each place should help the authorities with all their skill and experience in determining this momentous question; for I feel assured, the more I study it, that eventually the public will demand a solution of it; and when the problem has been solved we shall then see seaside and all other health resorts on their proper footing.

The health seeker requires, nay, demands, to be satisfied on a point of such vital importance to him.

I now have a few words to say on another subject—the recreation of the visitor.

We must recollect that when a visitor leaves his home—whether for a holiday or health's sake—he leaves all his pursuits and surroundings behind him. He is far from his books and other means of enjoyment during times when he is not in the open air taking exercise; and as his physical health improves so does his desire for mental enjoyment return, as it were, *pari passu*.

He cannot sit listlessly reading papers and novels all day: of them he soon wearies—in fact his mind quickly becomes jealous of his body; and justly, too, for are not the requirements of the latter instantly satisfied? Why, then, should not the returning

mental appetite be gratified as well? If it is not, the visitor will soon get tired of a place where food for both mind and body cannot be simultaneously obtained; the consequence will be that he will crave to leave the resort before his health is established; and if he remain in spite of his mental warning, the probability is that his physical health will decline, for the bodily organs require to be kept in well-balanced activity—without which perfect health is impossible; the idle brain will soon corrupt the active stomach, rendering it as idle as itself, and both will go down the hill together.

Commercially, the health resort will be the loser, for those who leave because they are tired of the town, or because they fancy it does not agree with them, do not generally speak well of the place which they have left under such circumstances. To obviate, therefore, this evil, which is a more widely-spread one than lodging and boarding-house keepers, as well as hotel keepers, are willing to believe, museums, good free public libraries, and winter gardens, should be established in every health resort, where local histories, local curiosities, local geological, archæological, and natural history specimens are to be found; where, in fact, the visitor can pursue his favourite studies under new auspices, and add to his store of knowledge; where he can thoroughly learn all that is known about the place and its neighbourhood where he sought health and found it; so that he may return home full of what he has seen and learnt, and inspire his friends with a desire to see the place he has seen, and to derive the same benefit that he did whilst recovering both his body and mind.

VI.—THE PHYSICAL GEOGRAPHY AND CLIMATE OF THE ISLE OF MAN.—How its Mountains, Valleys, and Seas affect its Climate: Illustrated by Diagrams, Maps, Wind Charts, &c. Meteorological Stations—Conclusion.

As I have so recently lectured on this, the concluding part of my subject, and although I could add much to what I then described, I do not see how I can condense what I have to say more completely than I ventured to do on that occasion.

I will now endeavour to show how our atmosphere and its currents are affected by the configuration and soil of the country, and how our knowledge may be made use of in preventing some of the evils incidental to the different varieties of climate to be found in England and Wales, illustrating my remarks, as much as possible, by reference to what is found in the Isle of Man.

In discussing the nature of the influence of the configuration of a country on its climate, it will be evident the further we proceed how wide the whole subject is, and how impossible it would be to deal with it within a limited time. Fortunately, however, we can select from the wide field before us many facts that will not only be of great interest, but of extreme usefulness, when considering the effects of climate on disease. In the first place, whenever we study physical geography and climate, we have certain features to deal with.

First, the plains, the elevated masses (mountains, hills, &c.), and the valleys.

Second, the waters which either wholly or partially surround the country, and those which form

the rivers and their tributaries ; and lastly, enclosed waters, such as lakes, lagoons, canals, &c.

We shall begin with the elevated masses, as they are essentially the most important, giving rise as they do to a great variety of climatal phenomena. Elevated masses of land, in the form of mountains and hills, constitute the watershed, form the sides of valleys, divert winds, and, by doing so, act as screens, if of sufficient altitude they increase the rainfall of an area, and lastly, store up the summer heat, which is gradually given out during the winter months when the sun's position is lowest, and its rays most oblique.

In England and Wales these elevated masses are to be found on the western and north-western sides. They are for the most part constructed of the oldest rocks, and tilt up, as it were, those of more recent formation towards the east and south-east.

This is well seen in the section before you of the Thames Valley from Broadway, Cotswold Hills, to Westerham in the North Downs. Being a geological section of the country between these two points, the tilting up at the western end is well seen ; and had the section been continued towards the range of Welsh mountains, of which Snowdon, Plynlimmon, and Cader Idris are remarkable members, we should have found the older sedimentary rocks below the line upheaved to the surface in the same manner until the carboniferous limestone and the old red sandstone come to the surface, which we should find lying against an upheaved mass of silurian clay schist, having a core of igneous rocks, similar in every way to what is shown in the section from the north-east

of Peel to Langness Point, where on both sides of your Island these two formations are seen to be tilted up by the masses of clay schist which have been elevated above their original level as sea bottoms by the intrusion of igneous rocks from below. On the north-west side of the Island we see Rock Mount caused by the intrusion of greenstone, and against the western side of the elevated land is found the red sandstone, which forms so characteristic a feature of the beautiful bay of Peel. Again, on the southern side of the Island, we see the carboniferous limestone lying on the red sandstone, which is tilted up by the silurian clay schist, which the great granite boss, that has upheaved South Barrule, has elevated so high above its original site.

If we now revert to the English section we shall see at the south-east end another remarkable tilting up of the strata caused by the upheaval of the Wealden series. It will be seen that the chalk range, which has an altitude of between 600 and 700 feet at High Wycombe, after dipping with the older strata below it, beneath the London clay basin of the river Thames, reappears on the south side of that river, to form the North Downs, which are separated by the width of the Wealden series from the South Downs exactly in the same manner as the old red sandstone and carboniferous limestone of Castletown are separated from those formations which are found at the north-east of Peel. The chalk, which once existed where the weald now is, has been entirely carried away, so that between the North and South Downs not a vestige remains to show that these two great ridges were formerly united. So in the Isle of

Man, although it is more than probable that the Castletown and Peel red sandstone and limestone were once united and formed a continuous sea bottom, it is evident, if ever that were the case, that their upheaval by the granite boss of South Barrule has led to their continuity being broken up, and their débris subsequently destroyed either by submarine or subaërial denuding influences.

As we find granite and other intrusive rocks at the very bases of our highest mountains both in England and Wales and the Isle of Man, I think it will be hardly necessary to pursue the subject further. In this Island the granite of South Barrule comes to the surface in the "granite" mountain, whilst that of Snaefell is seen at the Dhoon, and in both instances valuable minerals, such as lead and silver, are found, as at Laxey and Foxdale. There are other minor granite upheavals, as at Bradda Head, but as they all belong to the same geological category, we need not dwell upon them further.

Having thus briefly discussed the origin of the mountain system, I will now draw your attention to the valleys, which exercise so important an influence on local climate.

If we again observe the great valley of the Thames, we shall find that this remarkable area in England owes its origin to the tilting up of the land at the north-west and south-east, long after the deposit of the London clay and its underlying series, which, as will be seen by the section, was destroyed along with the chalk, except where protected from denuding influences. Evidence of this is seen in the capping of the chalk hills with plastic clay, as at High

Wycombe, and even so far south as Castle Hill, Newhaven, about nine miles from Brighton.

The analogue in the Isle of Man of this grand English physical feature is to be found in the beautiful valley between Douglas and Peel. This depression has been brought about by the tilting up of the land in the north and in the south, so as to produce a canting of the strata towards a line running irregularly between the eastern and western sides of the Island. During the Age of Ice, when this Island, like the neighbouring countries, was enclosed in a sheet of ice and snow, this ravine became filled with glacial drift, which the sea subsequently partially removed, thus dividing the Island into two, until a more recent upheaval arrested its destruction, and converted the Inland Sea Channel into dry land, along which the mountain streams soon found their way to opposite sides of the Island, the ridge in the valley near St. John's, of only 126 feet above the sea level at ordinary spring tides, determining their eastward and westward courses. Sulby Glen, Laxey Glen, and a host of other beautiful valleys in this favoured Island have had a similar origin to the great central vale just mentioned. It is possible, however, that these original ravine forms have been modified by the long continued grinding action of glaciers during the great Ice Age, which not only widened them, but exerted their mighty power in rounding the peaks of the mountains, which at one time must have characterised the scenery of this Island. To have a just appreciation of how peak after peak must have succumbed to the irresistible force of the ice cap which once overtopped the slieus (mountains) and kronks (hills) of Mona, one must stand on Snaefell, and then

look down on the rounded forms of the mountains which stretch far away to the south. This ice action which has had so visible an effect on the scenery, has left its mark, not only in the valleys and on the mountain tops, but its spoils, in the shape of boulder clay drift gravel, striated rocks and boulders, are to be found in every valley, far up the mountain sides, and along the coast of the north of the Island, forming precipitous cliffs, which are gradually yielding to the wasting power of the sea.

The third great physical feature belonging to this Island, and one that has a remarkable effect on its climate, is the surrounding sea, the warm waters of which, derived from the Gulf Stream, so modify the mean temperature of the winter as to bring the Island within the same isotherm as that of the south coast as shown by the map* on which are given the January and July mean temperatures, to which I shall again refer.

The next object is to show how these natural features of mountains, vale, and sea, modify the climate of the Island; and whilst doing so, endeavour to point out to you such simple truths as may not only teach us how and where to select sites for habitation under peculiar circumstances of disease, but how to carry the practical teachings learnt in the country at large into our towns and villages, and there benefit by the lessons they have taught us.

Climate.—It is difficult to map out the meteorologists' results, and show at a glance the nature of the different local climates throughout a country. Humboldt conceived the idea of representing the distribution of heat by curved lines which indicate equal temperatures throughout their courses. These

* This was done by an oral explanation of the maps, diagrams, wind charts, sections, &c.

are called *isothermal* lines. Alexander Buchan* has well carried out the plan in his maps on the temperature of the British Isles; but the credit is due to Dove for having first established their usefulness by constructing charts, which were published in 1853 by the British Association. Symons,† too, has represented approximately the rainfall of the British Isles by different shades of blue. The observations on the rainfall of this and other parts of the British Isles, have, however, hitherto been limited, with a few exceptions, to low levels, which can give no adequate idea of the real amount of natural water supply. The actual amount of rain, that is, the real source of the volumes of the several Insular rivers, is unknown; it is a matter of high importance, and should be ascertained, for in the future such facts will be required in developing the resources of the Island. Besides which a correct estimate of the climate cannot be formed without investigating its different elements at high levels.

The diagrammatic mode of representing the progress of weather during the year is the best means at present available for showing the fluctuations of the different elements of climate.

Wind charts, too, answer their purpose very well, and, when multiplied, as I have attempted to do, give useful and rather unexpected results. The force of wind could be shown in a similar manner. Still the mode of mapping meteorological results is at present unsatisfactory. There are, however, elements and characters in certain climates which no instrument yet constructed has been capable of indicating.

* Enlarged from Mr. Alexander Buchan's maps, illustrating the Temperature of the British Isles. See above.

† G. J. Symons, F.R.S. the author of "British Rainfall"—Stanford: London—and the most eminent authority we have on the subject.

Strange, however, as it may appear, whilst the meteorologist has failed to point out minutely the local climates of England and Wales, the study of the geographical distribution of disease has taught the medical man to do so, in such a manner as to be of essential service to him in giving advice as to where persons should live who are prone to certain diseases, and who naturally, for their own and their children's sake, would like to live where such diseases do not and cannot thrive.

THE CLIMATE OF THE ISLE OF MAN.

There is an erroneous impression abroad that places lying three or four degrees further north than the south coast of England must have a cold ungenial climate, quite unsuited for invalids and especially those who are delicate in their lungs.

Statements to this effect do not, however, always arise from ignorance ; in too many cases they are made with the view of keeping up the prejudice against high latitudes, and of encouraging the belief in the superior efficacy of the south coast for consumptive cases, a belief founded upon the opinions of medical men of the earlier part of this century, before the geographical distribution of this disease in England and Wales was made known.

Both the Isle of Man and the east coast of Yorkshire, including the beautiful health resort, Scarborough, with its fine climate, have hitherto suffered from the erroneous impressions and interested misrepresentations to which we have alluded. The Manx and the North Riding coasts lie within the same parallels of north latitude ; in fact,

that of the summit of Snaefell, 54deg. 15min. 47sec., runs through the Mere and Oliver's Mount, at Scarborough. Situated, as the Isle of Man is, in the midst of the Irish sea, which, through St. George's Channel, is continuous with that part of the Atlantic in which the Gulf Stream flows, it enjoys the full benefit of this wonderful oceanic current, having its origin in the Gulf of Mexico, the tropical heat of which it conveys to the western and north-western shores of Great Britain and Europe. The small size of the Island—145,325 acres, or 227 square miles 45 acres--and the great number of elevated masses within this limited area, conduce to the preservation throughout the year of the temperature the surrounding sea affords. The limited area forbids protracted frosts and intense cold, and the elevated masses, the mountains, store up the summer heat, giving it out during the winter months, thus postponing the rigour of this season until the sun has regained some of its power. The northern mountains cover an area of 19,898 acres, and the southern 8,495, above the line of cultivation. The mean height of these two mountain groups amount to 1,545 feet in the northern, and in the southern to 1,355 feet, facts in the physical geography of the Island having an important and beneficial influence on its climate. •

The more insular in character a climate is the more generally suitable it is for the health seeker. These characters are as follows:—It must be remembered that large masses of water anywhere, and especially warm water, like the Gulf Stream, diminish the range of annual temperature. A place having a high mean annual temperature as well as a small

mean annual range of temperature is said to have an "insular climate"—i.e., it is not subject to extremes of heat and cold, so prejudicial to the weak and the invalid. As a rule, the smaller the island, the more does it partake of the climate of the surrounding sea, the range of the temperature of which is known to be exceedingly small.

The mean annual temperature of the Isle of Man is 49·4deg. Fahr. If we compare this with that of other localities in the more southern parts of England, we shall be able to appreciate its true significance: for instance, at Holkham, Norfolk, 1deg. 19min. further south, we find the mean annual temperature 49·1deg.; at Great Malvern, 2deg. 5min. S., 49·6deg.; at Lampeter, Cardigan, 2deg. 9min. S., 49·4deg.; and Brighton, 3deg. 27min. nearer the Equator than the Isle of Man, has a mean annual temperature of 50·0deg., or only six-tenths of a degree higher. Now, let us compare the mean annual range of temperature of these southern places with that of the Isle of Man, which is 18·4deg., the difference between the mean temperatures of January and July, and we find that it is, at Holkham, 23·4deg.; Great Malvern, 24·0deg.; Lampeter, 21·5deg.; and Brighton, 24·2deg. We will now compare the mean monthly temperatures with those experienced along the south coast. Eastbourne, Brighton, Worthing, Osborne, Ventnor, Bournemouth, Sidmouth, Torquay, Teignmouth, and Devonport may be said to well represent the south coast of England. Now, if we take their mean winter temperature,* we shall find that it is actually colder than that of the Isle of Man: for it is 42·10 deg., as compared to 42·16 deg. The January (41·4

* December, January, and February.

deg.) is warmer in the Island than at Eastbourne, 39·3 deg.; Brighton, 39·2 deg.; Worthing, 39·6 deg.; Osborne, 40·2 deg.; Bournemouth, 40·5 deg.; and Sidmouth, 41·3 deg. February, with its mean temperature of 42·3 deg., is warmer than Eastbourne, 41·6 deg.; Brighton, 40·7 deg.; Worthing, 41· deg.; Osborne, 41·4 deg.; Bournemouth, 42·3 deg.; and Teignmouth, 41·8 deg. December has a mean temperature of 42·8 deg.; and this again we find exceeding the records in several places on the south coast, as at Eastbourne, 42·1 deg.; Brighton, 39·3 deg.; Worthing, 42·2 deg.; Osborne, 42·6 deg.; and equal to Devonport, 42·8 deg. These figures are sufficient in themselves to show that, during the winter months at least, the climate of the Isle of Man may be bracketed with that of the south coast, so far as "mildness" is concerned, although, as regards its tonic and bracing effect, its superiority is undoubtedly much greater. During the summer the climate of the Island is proportionately much cooler than that of the south coast and the inland portion of England. For instance, the mean temperature of its hottest month, July, is only 59·80 deg., whilst that of the ten places selected on the south coast have a mean of 62·33 deg., or a difference of 2·53 deg. in favour of the northern resort. The mild winter and cool summer are both due to the "insular" character of the climate and the Island's shores being washed by the waters of the Gulf Stream. The mean temperature of the months are as follows:—January, 41·4 deg.; February, 42·3 deg.; March, 42·3 deg.; April, 46·4 deg.; May, 52·2 deg.; June, 57·1 deg.; July, 59·8 deg.; August, 59·2 deg.; September,

56·0 deg.; October, 51·3 deg.; November, 45·2 deg.; and December, 42·8 deg. Mean, 49·4 deg.

I have given the data for the wind and rain, furnished by the two lighthouse stations at the Calf of Man and Point of Ayre, for the reason that they extend over the greatest number of years, and are so associated that it is possible, by a careful study of them, to estimate the amount of moisture and heat that is brought by the winds from each point of the compass.

As to the Insular rainfall, until we get rainfall observations from the highest points in the Island, it would be misleading in the extreme to determine by the observations made below the 1,000 ft. level., the real amount of rain that falls annually over the Island, which, considering the great mean altitude of its mountain ranges, must, of course, be far in excess of what would it be below at low levels, or even at 1,000 ft. above the level of the sea.

To show how great an influence the physical configuration of the Island has upon the local winds, I may instance the fact that on the Calf of Man more *north* winds are registered than at the Point of Ayre; we have, however, only to study the precipitous cliffs south of Peel to the Calf to see how the winds from the north-west and west must be diverted into a northerly direction by the bold "steep-to" cliffs against which they impinge.

This diversion of winds is of great importance; and local winds should be well studied, for on them must depend the direction of the streets of future Health resorts.

The Winds.—A careful summary of the 17 years' observations at the two extremes of the Island—viz.,

the Calf of Man and the Point of Ayre lighthouses—shows the great preponderance of the westerly winds, and especially of the south-westerly.* These winds, the warm sea, and the storage of heat in the elevated masses combine to form the exceptional winter climate of the Island. The † wind charts show at a glance the relative prevalence of the winds from each of the eight points of the compass for each season. The easterly winds are shaded darker than the westerly. In adding the numbers together, the “calm” days would be represented by the number of days wanting to make up the 90 days in the winter quarter, the 92 days in spring and summer, and the 91 in the autumn.

The Rainfall.—The mean rainfall at the Calf of Man and Point of Ayre for the two periods 1831-47 and 1877-81—twenty-two years—amounted in inches as follows:—January, 2·06; February, 2·12; March, 1·75; April, 1·75; May, 1·43; June, 1·98; July, 2·43; August, 2·83; September, 2·13; October, 2·66; November, 2·78; December, 2·25. Total, 26·17 inches.

Metcorological Stations.—In order to ascertain the real value of the climate of this Island, and every other health resort, more, and judi-

*TABLE SHOWING THE MEAN NUMBER OF DAYS EACH WIND BLEW AT THE POINTS NAMED DURING THE 17 YEARS 1831-47.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calms.
Winter	7·0	5·9	6·5	15·7	8·8	17·9	13·5	12·7	2·0
Spring	10·1	9·9	10·9	12·5	7·7	14·0	11·3	12·9	2·6
Summer	10·5	5·5	6·6	8·4	9·7	19·0	14·6	16·0	1·7
Autumn.....	7·3	6·0	6·8	13·3	9·9	18·3	14·6	13·5	1·4
Totals	34·9	27·3	30·8	49·9	36·1	69·2	54·0	55·1	7·7

Westerly Winds ...	...	...	...	...	...	...	...	214·4	Days.
Easterly Winds ...	...	...	...	...	...	...	...	142·9	„
Calms ...	...	...	...	...	...	...	...	7·7	„

365·0 „

Excess of Westerly over Easterly Winds, 71·5 Days.

† These were exhibited and explained during the lecture.

ously placed meteorological stations should be established for the purpose of ascertaining the nature of the local climates of the different health resorts. There should be at least two in each town: one facing the sea, another at the highest point within the town, and where a third is possible it should be placed in the most sheltered spot.

For general scientific purposes, for ascertaining the general climate of the Island, stations should be established on some of the highest points to ascertain the rainfall and wind direction. In these cases self-registering instruments should be used.

Conclusion.—The above are the principal features of the climate of this Island. They afford sufficient evidence in themselves of its suitability as a health resort, and incontestably prove its exceptional character, when compared with other climates in the British Isles and the continent of Europe lying within the same parallels of latitude.

Favourable, however, as the general climate is of this beautiful Isle of mountains and glens, a more careful study of its physical geography has revealed numerous sites where the physical features and the atmospheric conditions combine to produce local climates calculated to meet the requirements of a large number of variously affected health and repose seekers.

In fine, the climatal resources of the Isle of Man, like many other gifts with which nature has endowed it, require to be better known before they can be as fully and widely realized as they so well deserve to be.

THE END.

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FLEETWOOD...T. H. CARR.
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DOUGLAS.....THOS. P. ELLISON.

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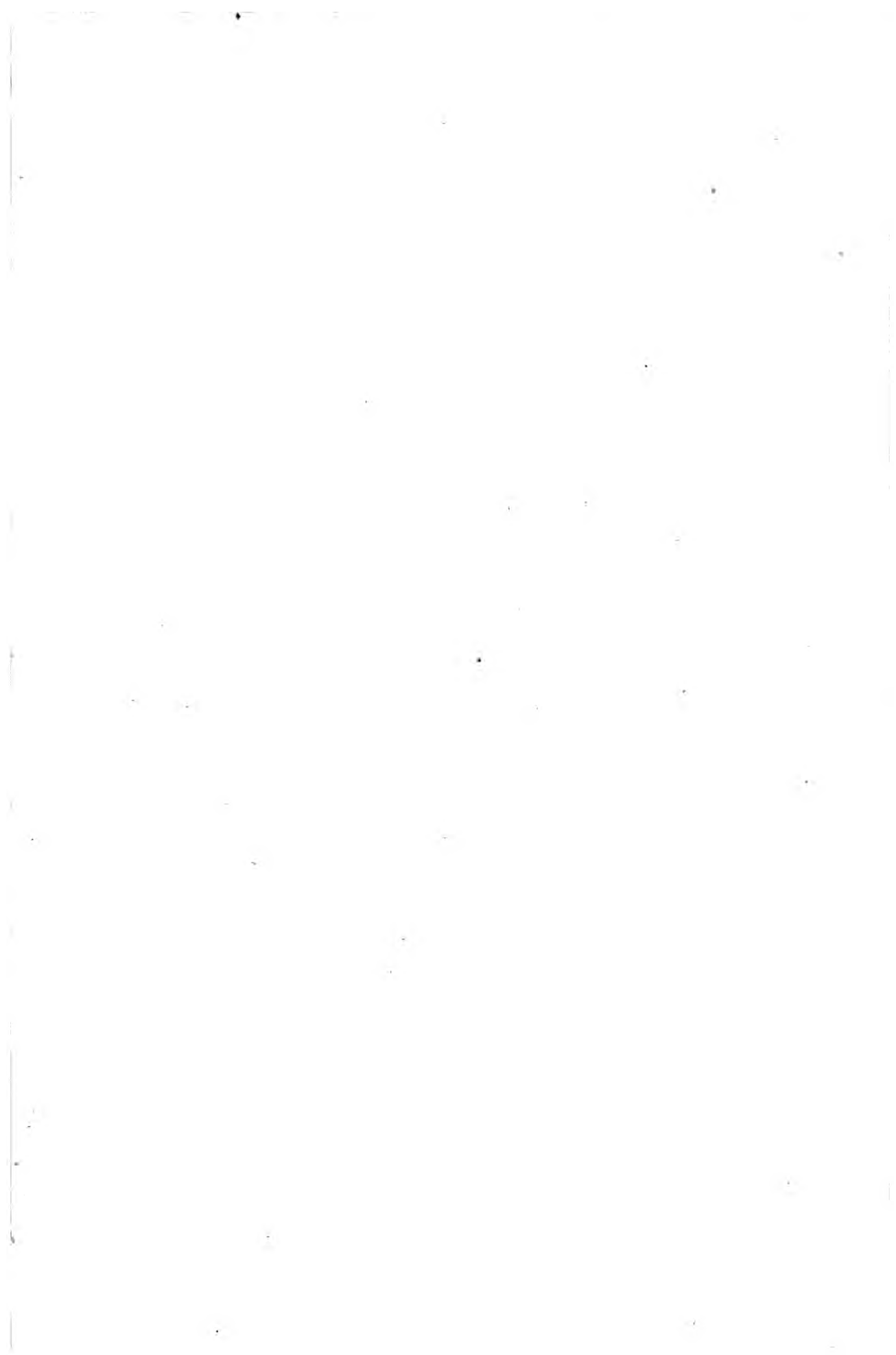
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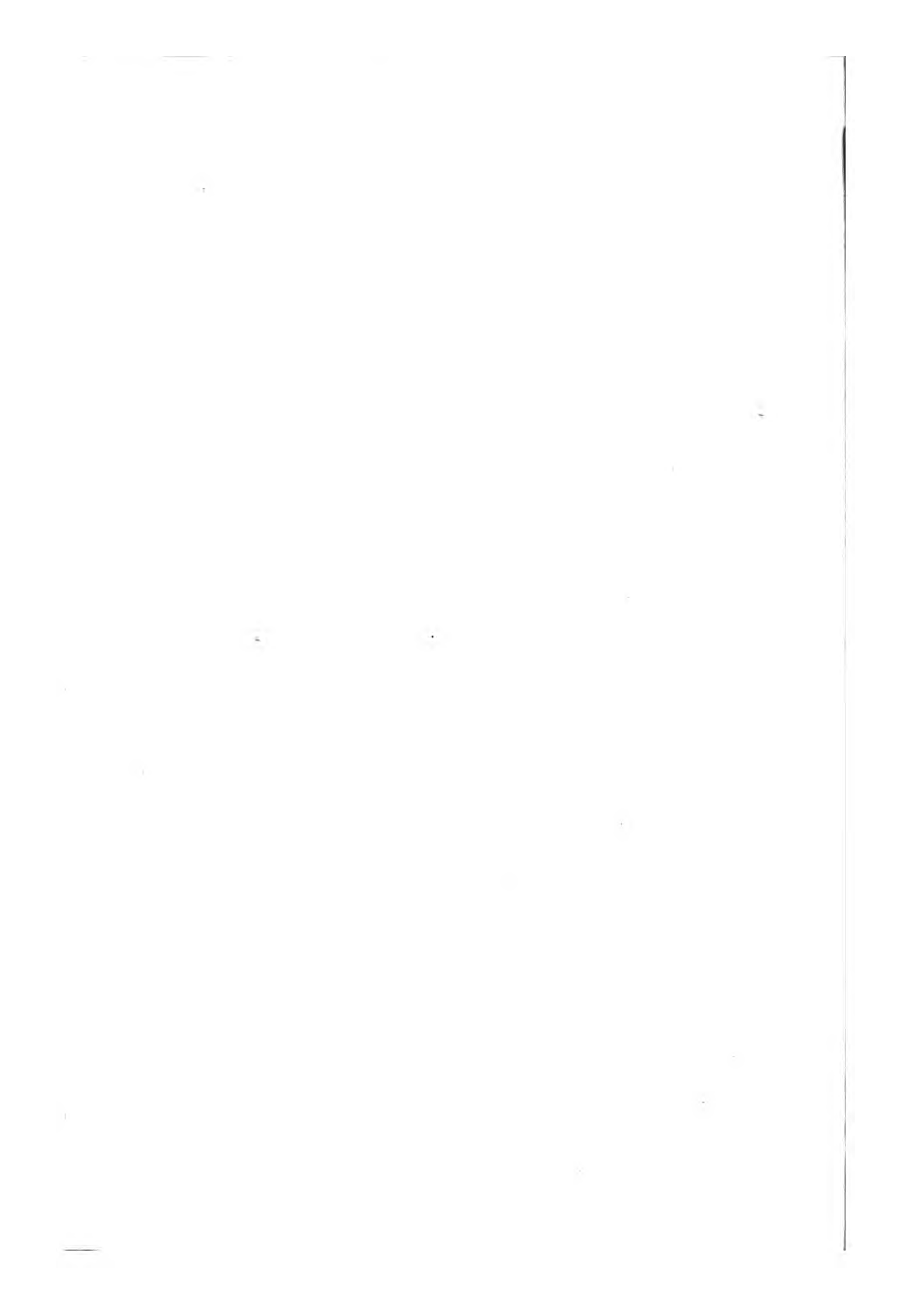
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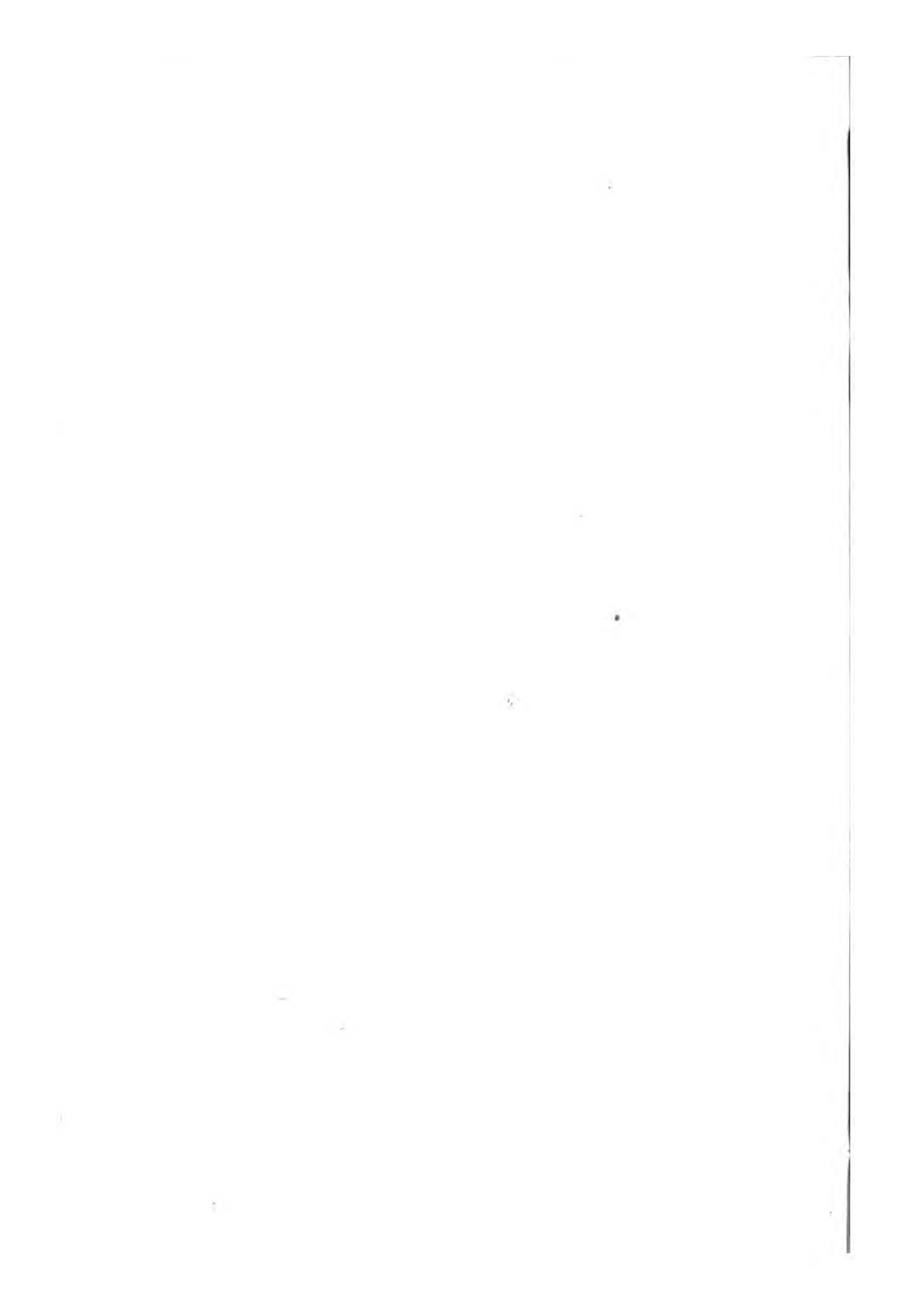
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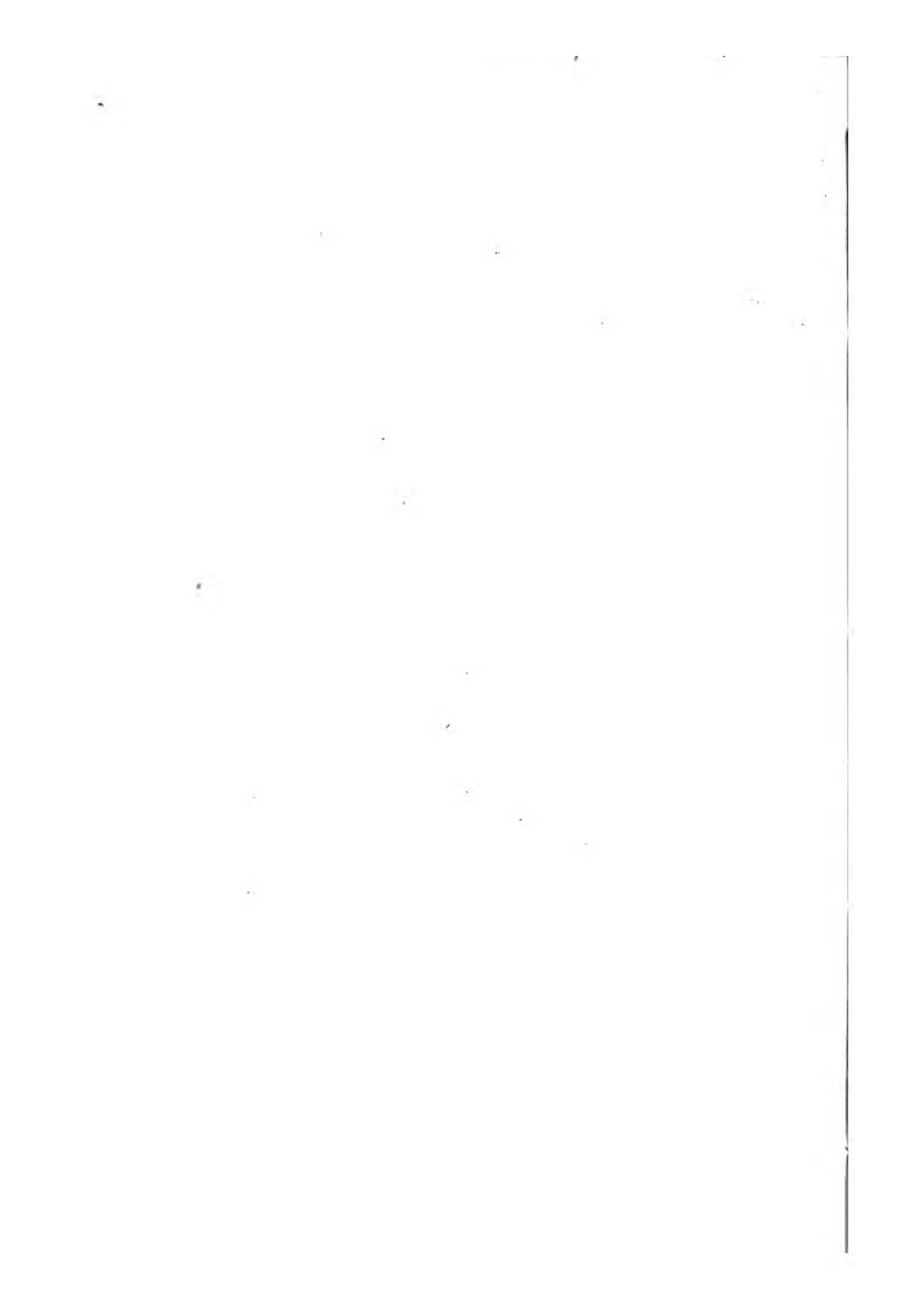
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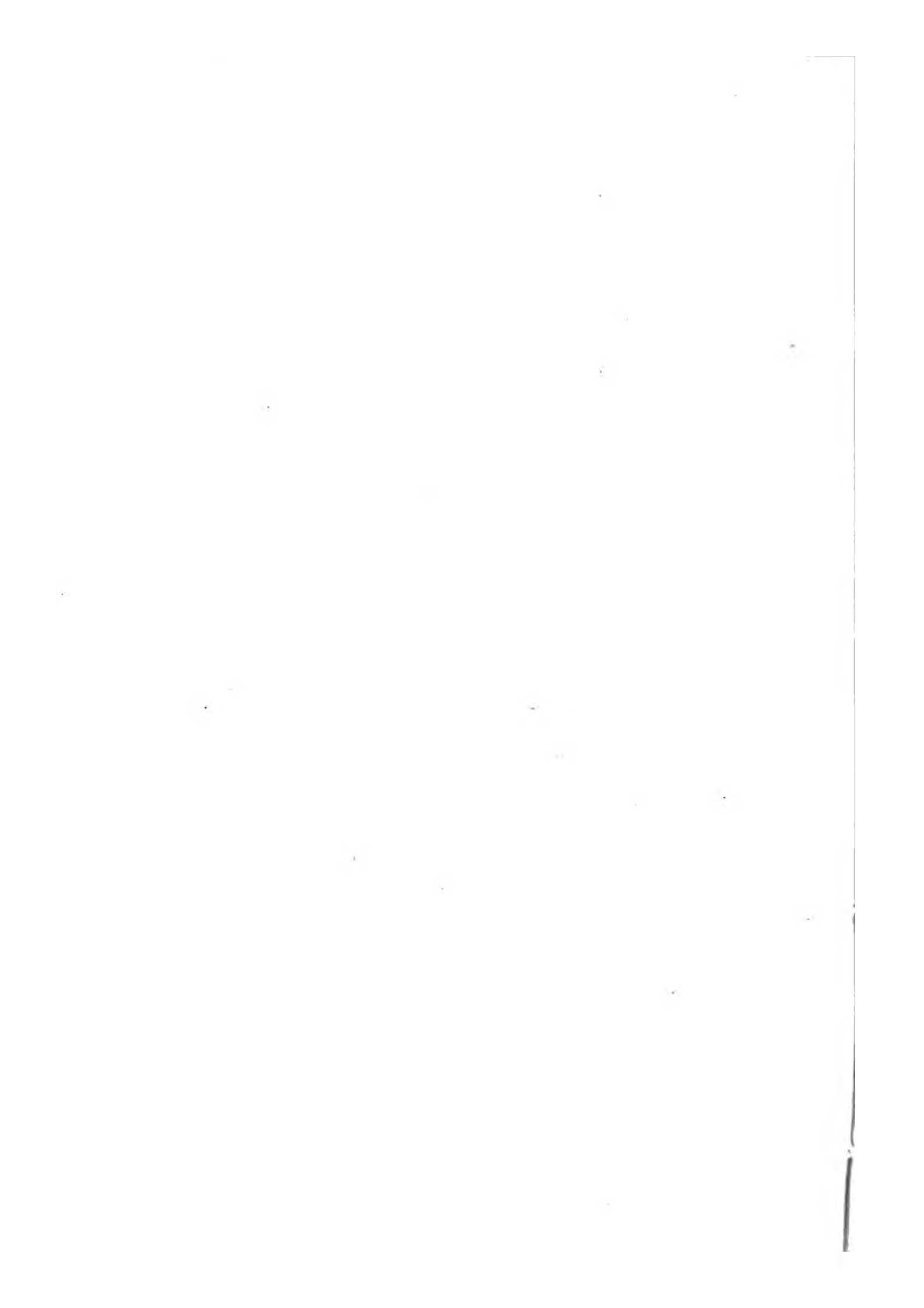
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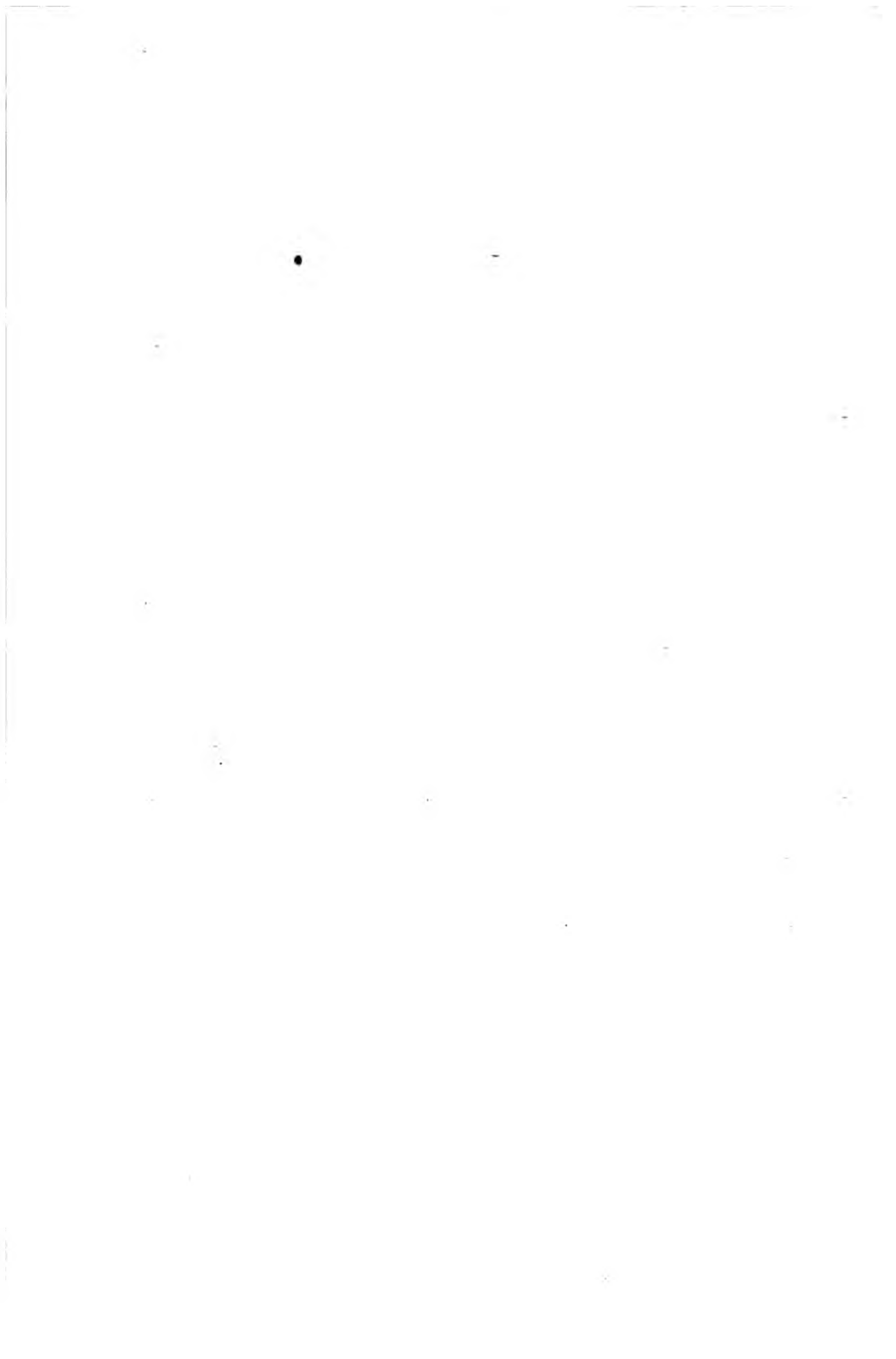


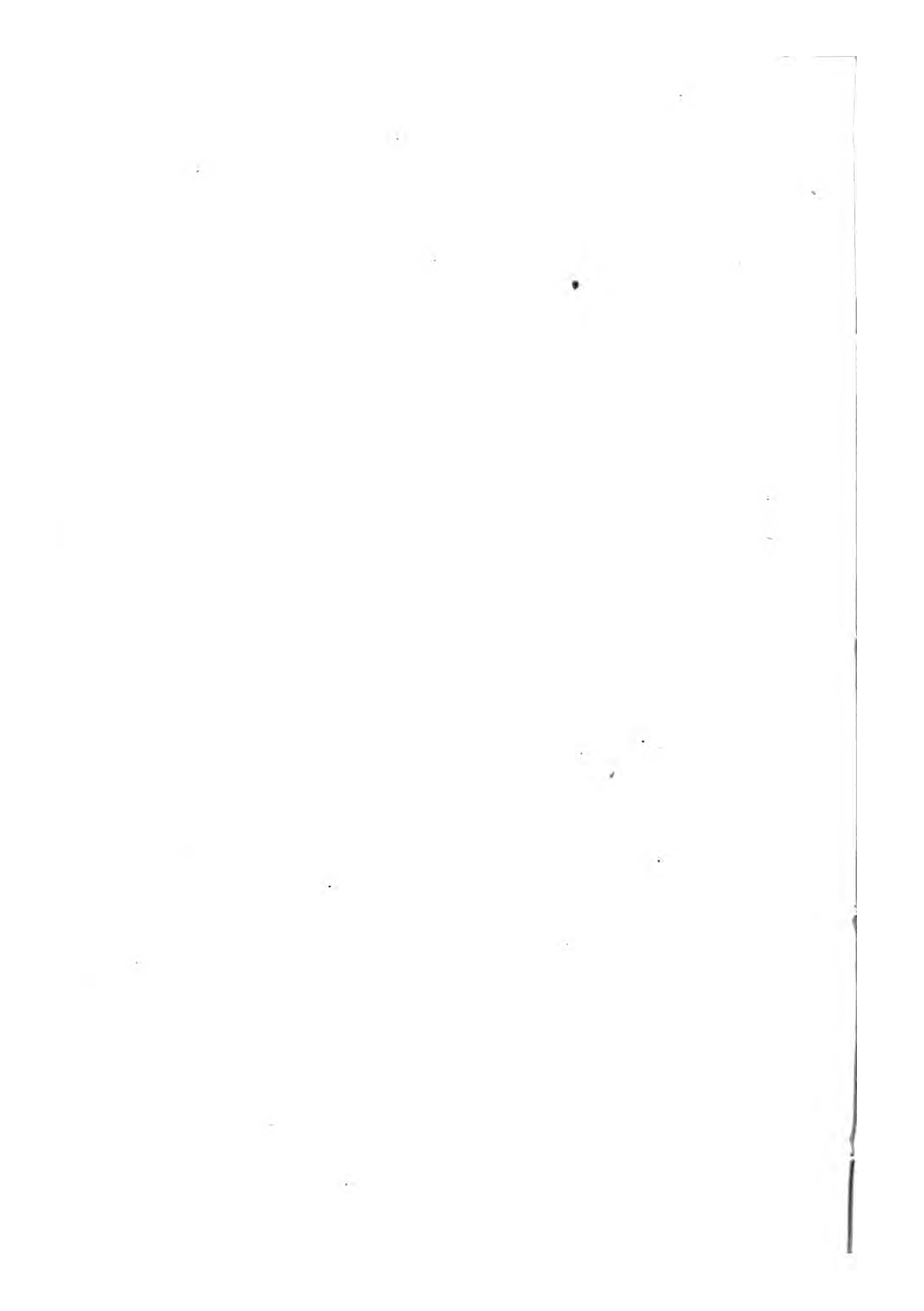


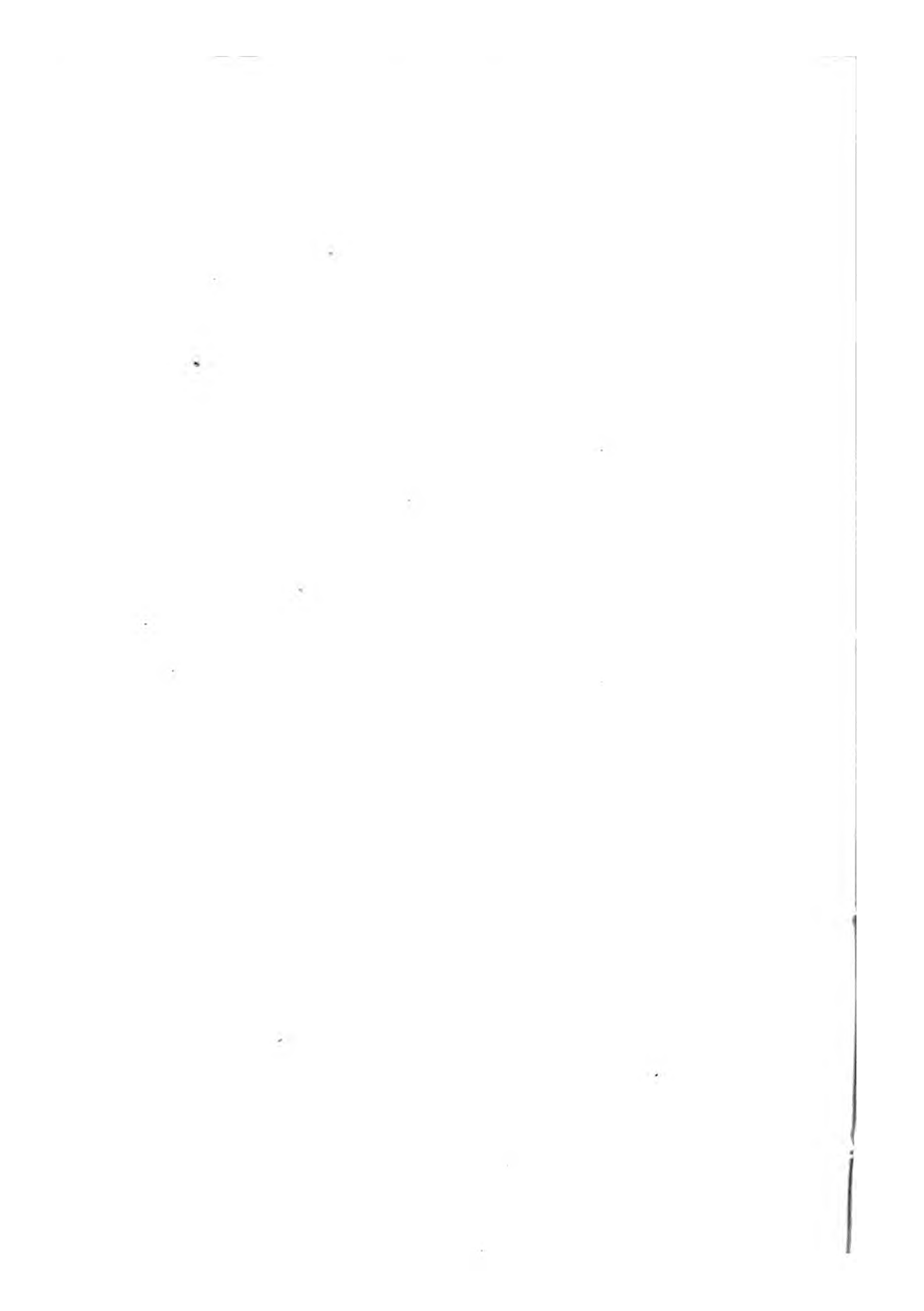


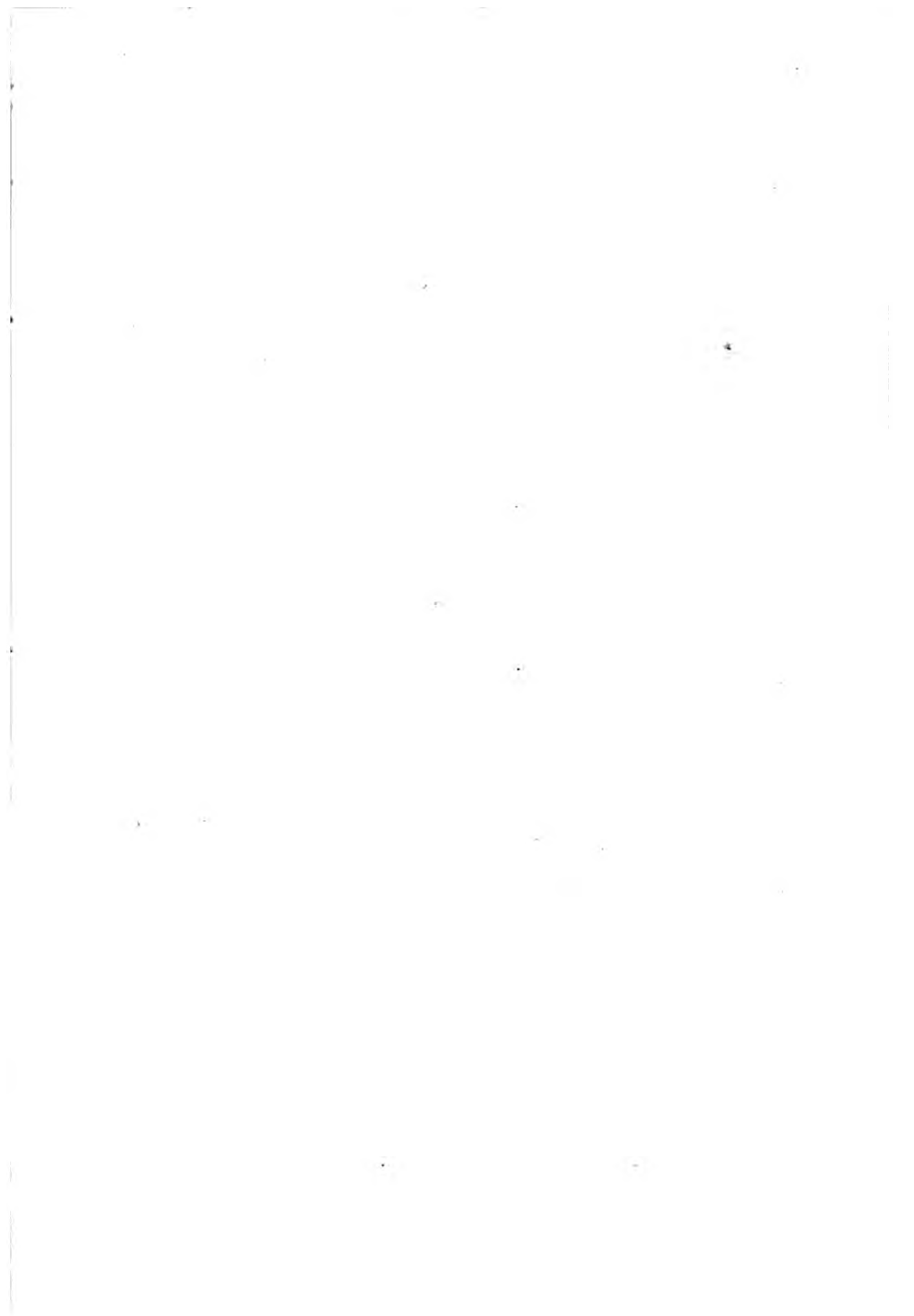


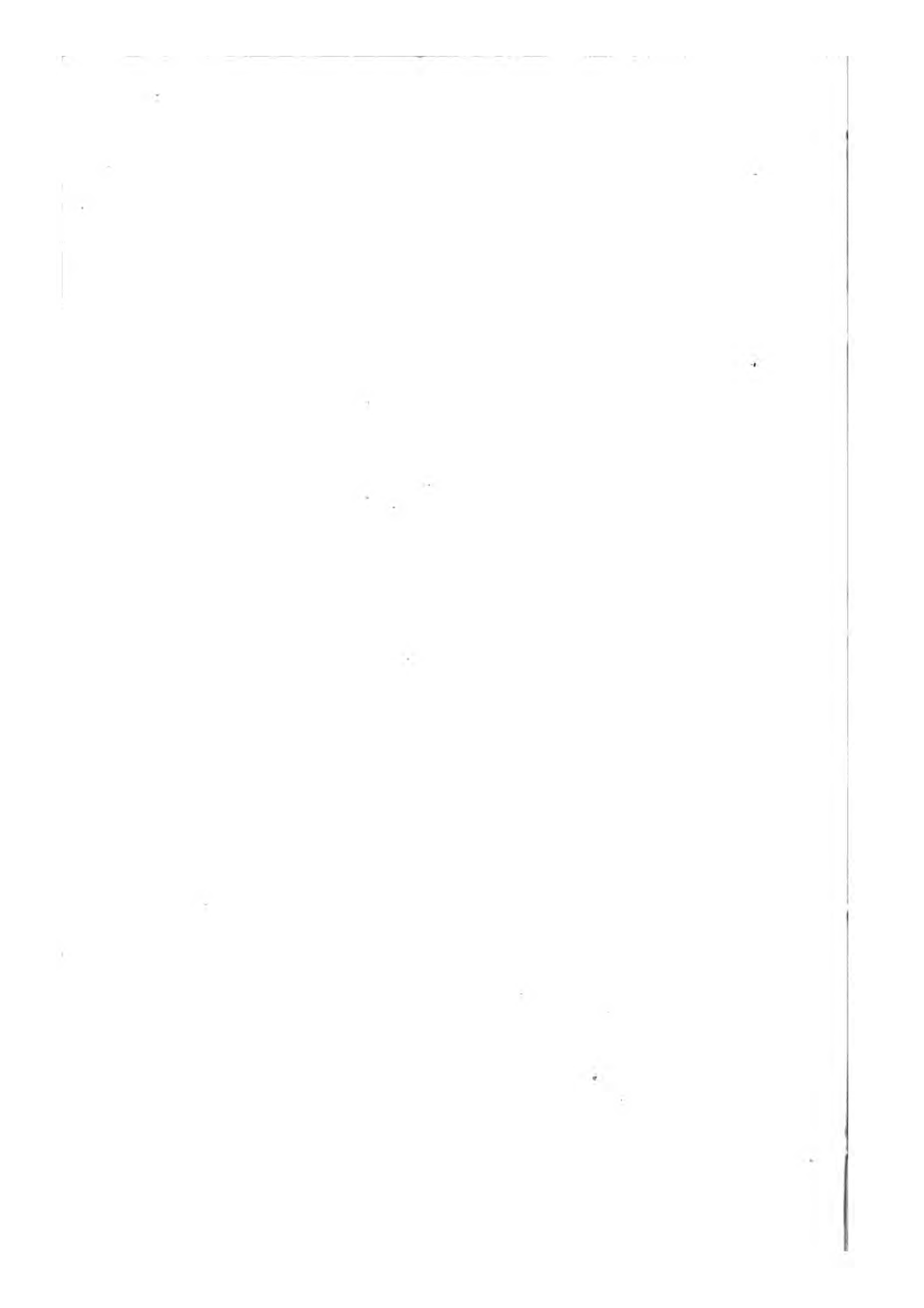


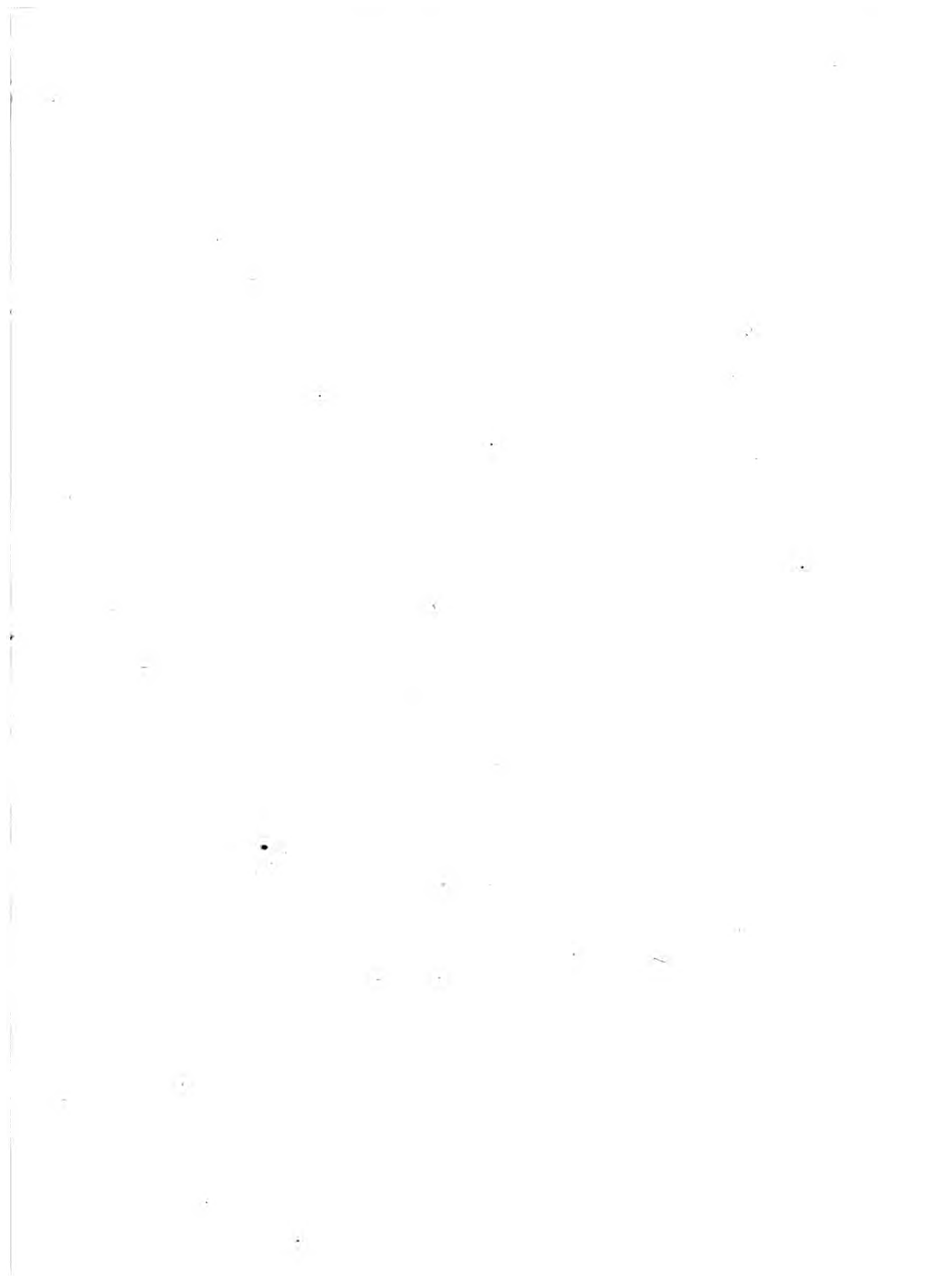


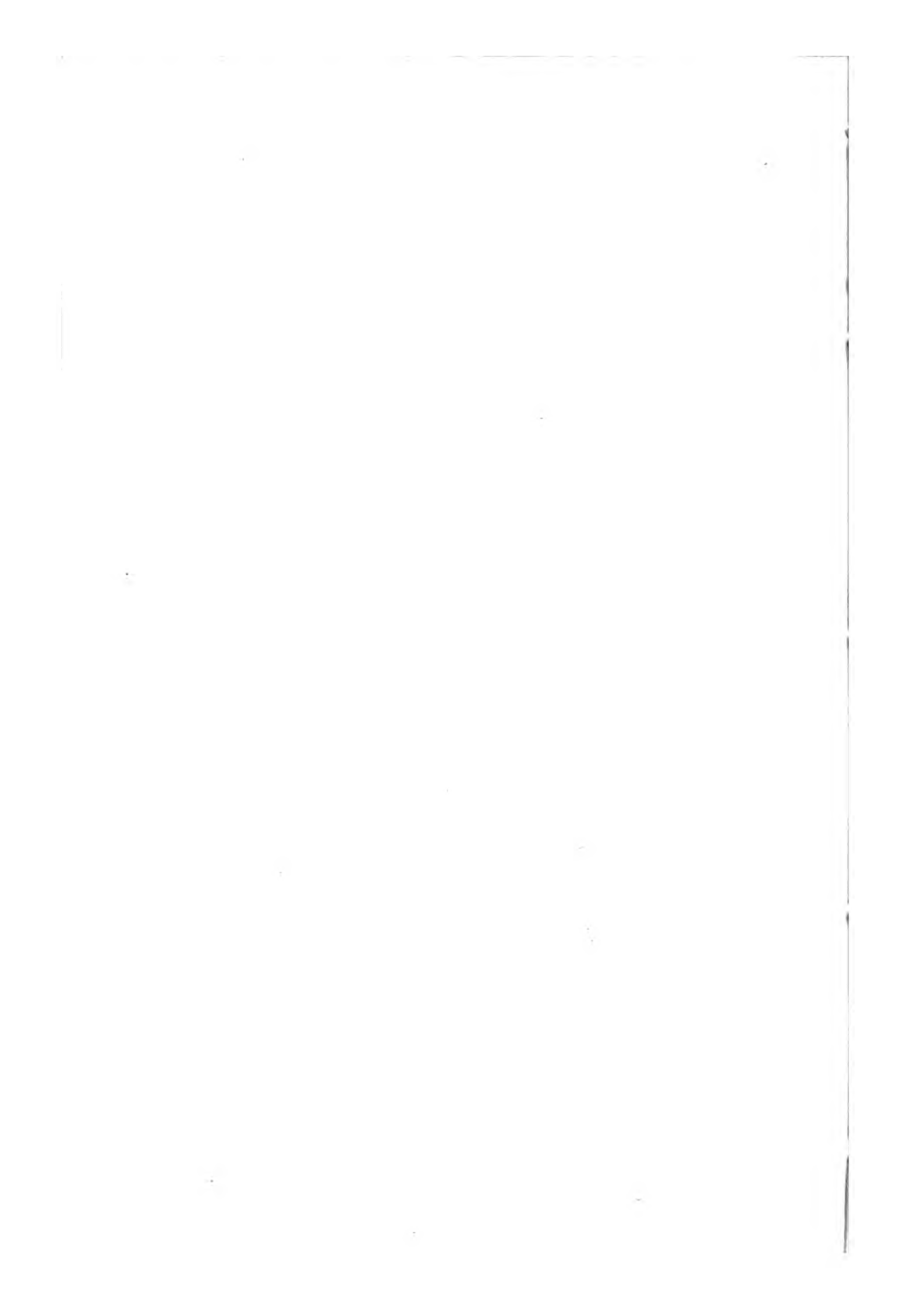


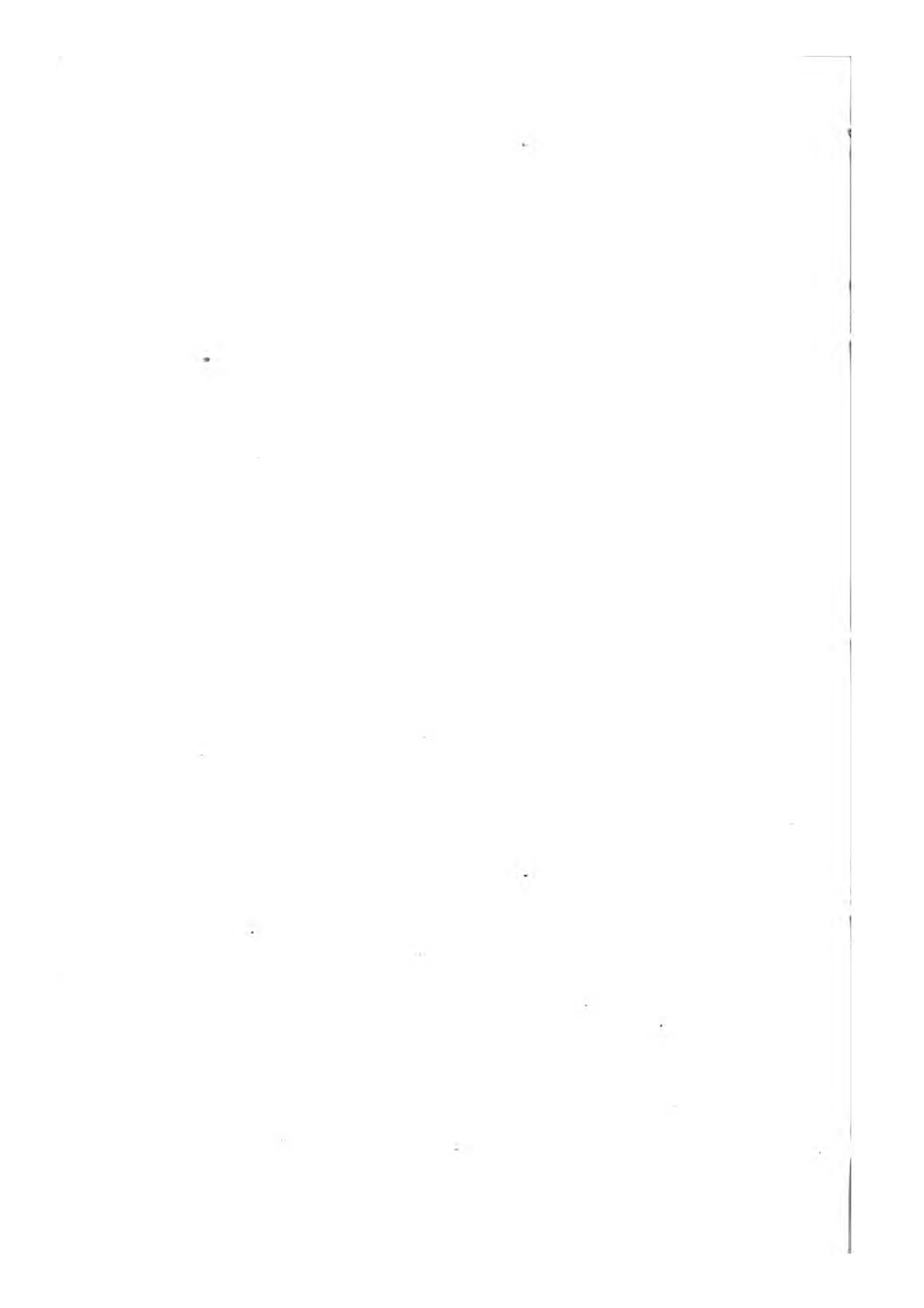


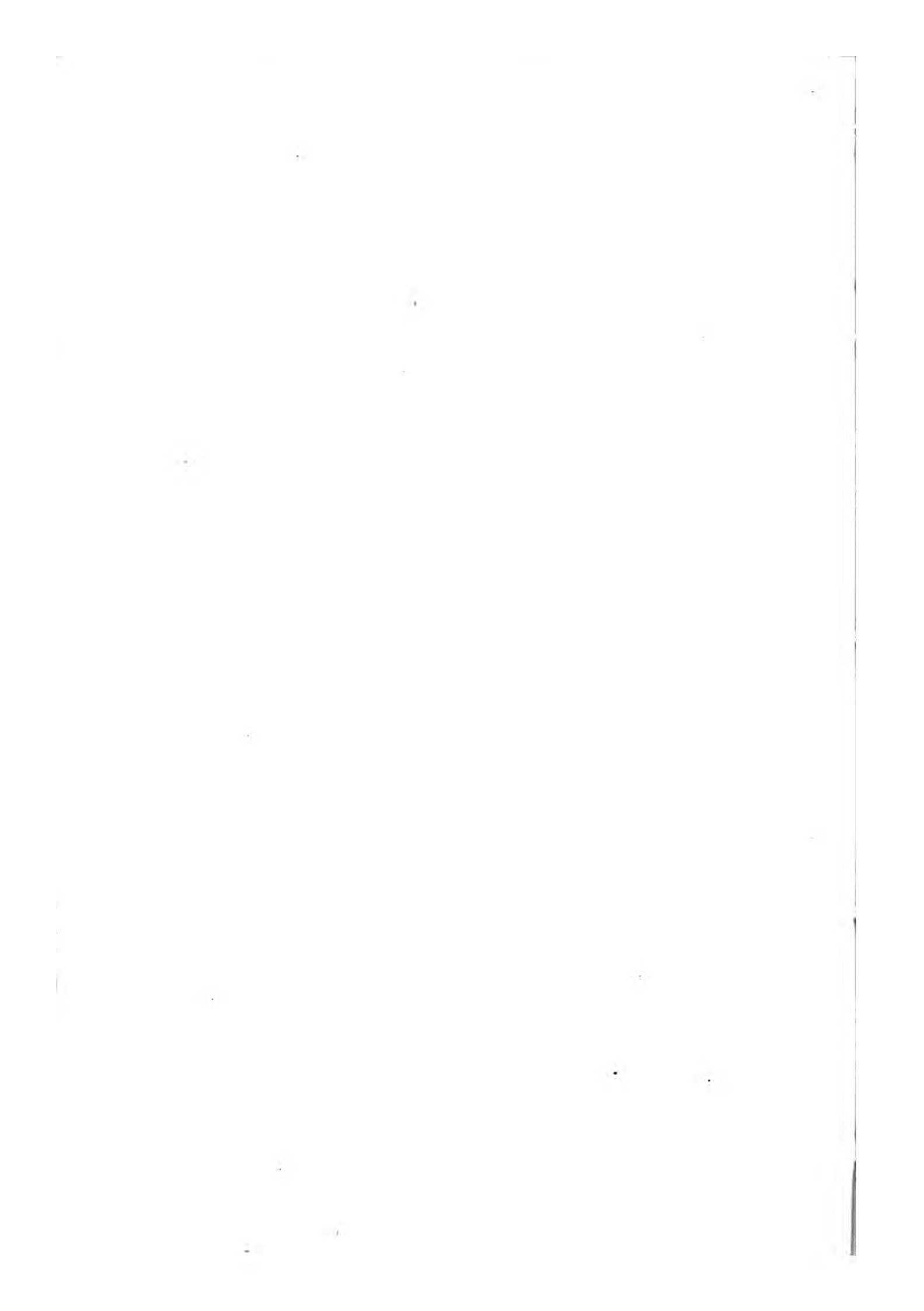


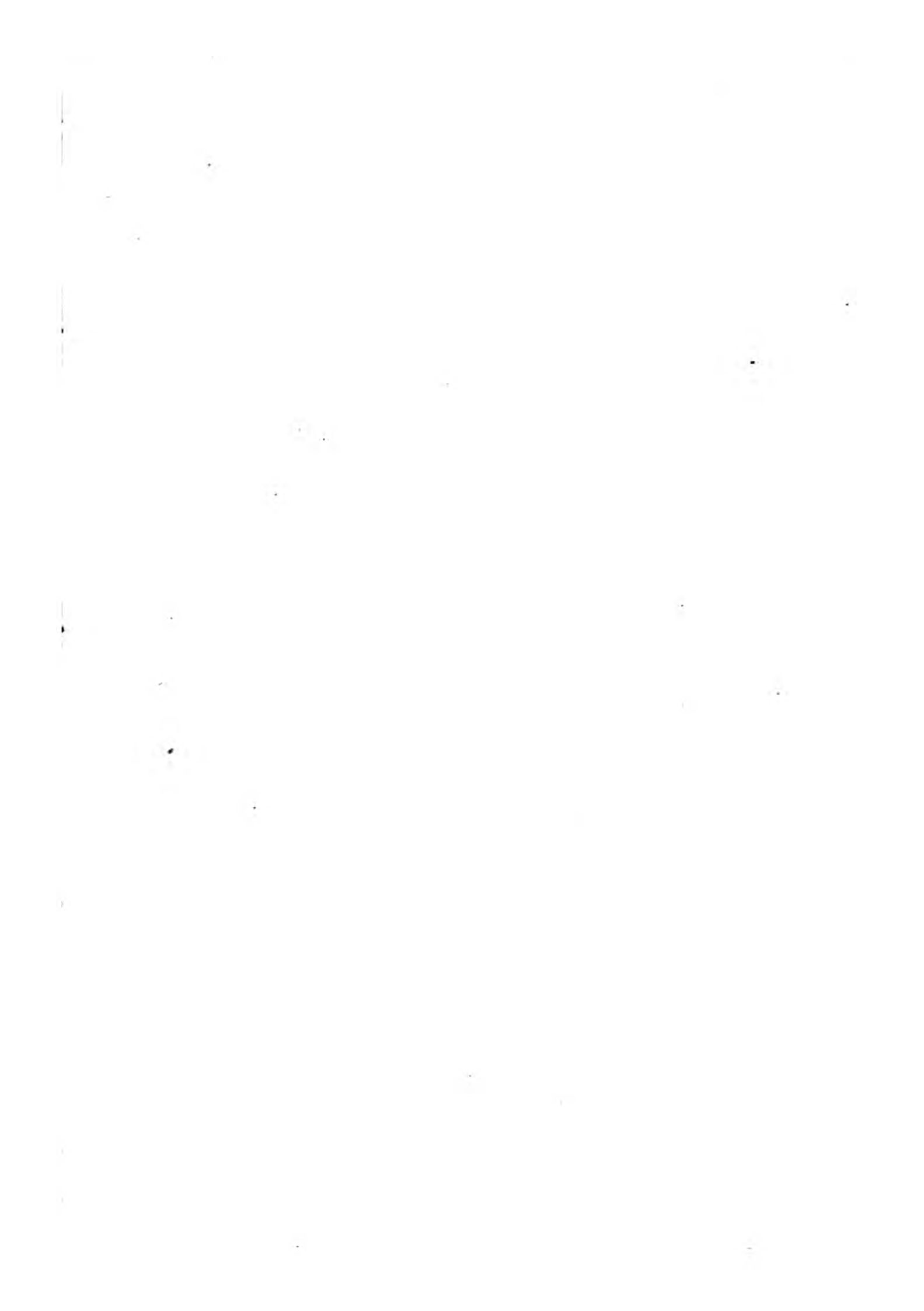












The first part of the document discusses the importance of maintaining accurate records. It emphasizes that every detail matters, from the date of entry to the specific observations made. This section also covers the methodology used for data collection, ensuring that the process is consistent and repeatable.

In the second section, the authors describe the results of their initial experiments. They note that there was a significant correlation between the variables being studied, which supports their hypothesis. The data shows a clear trend that aligns with previous research in the field.

The third section provides a detailed analysis of the data. It includes several tables and graphs that illustrate the findings. The authors explain how these results compare to theoretical models and other studies. They also discuss the limitations of their current work and suggest areas for future research.

Finally, the document concludes with a summary of the key findings and their implications. The authors stress that their work contributes to the understanding of the subject and provides a foundation for further exploration. They encourage other researchers to build upon their findings and continue to advance the field.

