

# Atlas of Pathologic Anatomy

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By Wilhelm Doerr, Gerhild Schumann and Günter Ule



Georg Thieme Publishers Stuttgart



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By Wilhelm Doerr, Gerhild Schumann and Günter Ule  
874 illustrations in color

Translated by David P. Winstanley



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Doerr/Schumann/Ule  
Atlas of Pathologic Anatomy

In grateful memory of

ALEXANDER SCHMINCKE (1877-1953)

EDMUND RANERATH (1899-1961)

JULIUS HALLERVORDEN (1882-1965)

## Foreword

In the winter semester of 1952/53 W. Doerr was asked by Dr. h.c. Bruno Hauff to prepare, if possible, an atlas of pathological anatomy comparable to the atlas by R. Rössle and K. Apitz (1951), and which perhaps might complement or even replace the latter. This invitation was accepted with a great deal of pleasure, but the commitment could not be fulfilled for a long time, partly because of the demands of a German academic career with its periodic transfers (to Berlin-Charlottenburg in 1953, Kiel in 1956, and back to Heidelberg in 1963) and ensuing upheavals, and partly because of the continuous search for a prototype of the "adequate" picture, which led to constant experiments with new methods of color photography. These would not have been successful had not G. Schumann, in long collaboration with Mrs. E. Wübken, developed a method which in the end produced the results presented here. The technique has proved its value for all aspects of pathological morphology, including neuropathology, dealt with here by G. Ule. It is, of course, obvious that the best photography is useless if specimens are not so well prepared that they will satisfy even the most critical esthetic demands. We were fortunate to enlist for this purpose the help of Messrs. Georg Berg and Paul Schubach, and the assistance of Mrs. M. Kienle. They turned out to be patient and skilful collaborators who always did their very best, irrespective of the time and effort involved. The long history of pictorial representation in the form of an atlas goes back to the "Fabrica" of Vesalius (1543). The monumental work of Jean Cruveilhier (Paris, 1829–1842) represents a high point in the state of the art. His colored lithographs gave way to water colors in the work of Kast, Eugen Fraenkel and Rumpel (Hamburg and Leipzig 1892–1909) in the "chromographic reproduction by the Art Institute of G. W. Seitz in Wandsbek." The "Kast-Fraenkel-Rumpel" appeared in instalments, and its color reproductions were most meticulously executed, but even in the "good old days" concern about the financial aspects seems to have periodically threatened the appearance of the atlas (see the foreword of October 1, 1909, when the work was finally completed). Among other interesting publications the atlas of Albers (Bonn 1847), Bock (Leipzig 1855) and of Bollinger (Munich 1901) deserve to be mentioned here. An entirely new approach was made in 1927 by Christeller in Leipzig. He personally prepared whole organ sections using his own technique, and photographed them in color. They were then reproduced at the low magnification of a hand lens and proved to be

extraordinarily instructive. But Christeller's technique is difficult. It could not be used on a large scale. His book thus remains a delight for the expert, the unequaled achievement of an individual. Its effect, however, was necessarily limited.

The situation changed with the appearance of the book by Robert Rössle and Kurt Apitz. Even today the expert will view the color photographs produced in 1940–1945 with admiration. Unfortunately the reproductions were too small, and histopathological comments were lacking.

Since then there have been marked improvements in the techniques of preparing, photographing and reproducing specimens, as shown by the splendid work of Montgomery (Edinburgh and London), which finds its counterpart in the highly successful books by W. Sandritter and his school (Stuttgart 1965–1970). Nevertheless we have taken the liberty of presenting our own atlas. We did so for the following reasons: we have never used 24 x 36 mm films, but have always relied on the 9 x 12 cm format, in color. The macroscopic appearance of the specimens was compared to the large histological section of the whole organ – the "holoptic tetrand section;" whenever necessary, these sections were also photographed at a higher magnification to show details better. Our large sections had to be of such quality that they would also pass critical analysis by microscopic examination. However, many of the macroscopic illustrations were subject to the necessity of using sometimes vertical, sometimes horizontal format, and to the constraints of layout; thus, regrettably, it was not always possible to adhere strictly to a systematic sequence of presentation, particularly in the chapter on the nervous system.

The sequence of illustrations has been so arranged that, as in demonstrations and courses of pathological anatomy, an effective interplay of the macroscopic with the microscopic findings is facilitated. Our atlas is intended for students in their clinical years, for interns, and for all physicians who may want to participate in clinicopathological conferences. It is also for our colleagues in the fields of practical and theoretical medicine, who are looking for a quick and convenient survey of the essential findings in the major disease categories.

It has been assumed that the reader has acquired an elementary knowledge of anatomy and histology, and has had some exposure to clinical medicine. The text has deliberately been kept short. The intention was not to write a textbook, but to supplement the text-

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books and synopses already available. In the choice of reproductions we have limited ourselves to illustration of established knowledge only, and to demonstration and discussion of continually recurring *typical* changes in organs and tissues. We have ignored the special cases and have deliberately disregarded "esoteric" diseases. Undoubtedly other choices could have been made, and almost certainly the user of the atlas will miss this or that entity. May we, therefore, point out that we had to be selective? This is also the reason why, for the time being, we have very reluctantly foregone the inclusion of electron photomicrographs.

We are grateful to many friends and colleagues for counsel and help, for the loan of material, for stimulation and criticism. Thanks are due to Dr. Fritz Bühler, our former associate, now scientific assistant at the 1st Medical Clinic of the University in Mannheim, for his unstinting help with the proofs and, particularly, with the evaluation of the color reproductions. We thank Priv.-Doz. Dr. W.-W. Höpker for compiling the index, and gratefully acknowledge the unbelievable patience of our publishers, Messrs. George Thieme, Stuttgart, and of the graphic art firm Brend'amour, Simhart and Co. (Munich), responsible for the reproductions.

It has always been a great pleasure to discuss with Dr. med. h.c. Günther Hauff, our publisher, the numerous questions concerning the factual and artistic details of this undertaking. We were greatly impressed

by the maturity of his judgment and by his unconditional willingness to subordinate questions of finance and of other details to considerations of technical and artistic relevance. Our most sincere thanks go, therefore, to Dr. Hauff.

The Editors would like to express their thanks also to Professor Aterman for his translation of the Foreword and Introduction to the Atlas.

Readers who view pathological anatomy as the morphological expression of life disturbed, and who will, it is hoped, use this atlas time and time again, will acknowledge Friedrich Hölderlin's insight in his *Hyperion* expressed in these lines from the Latin of Flemish monks:

NON COERCERI MAXIMO, CONTINERI TAMEN A  
MINIMO DIVINUM EST.

(Not to be constrained by the greatest, and yet to be contained within the smallest, that is divine). No words can better express the essence of a scientific morphology. *Scribendi recte sapere est et principium et fons!*

Heidelberg and Stuttgart

W. DOERR  
G. SCHUMANN  
G. ULE

## What the User of the Atlas Should Know

This atlas is a pictorial record of the important and typical findings in the more common diseases of man. Only occasionally, for didactic reasons, are entities shown that are no longer of any significance in most countries (laryngeal diphtheria, for example), or that are caused by the pathologic side-effects of potent therapeutic agents. The arrangement of the atlas is based on the pathology of *organs*. It can therefore be used with every textbook of pathological anatomy, and should be a natural complement to the widely used pocketbooks and synopses of pathological anatomy.

The atlas does not deal with syndromes, or with the course of diseases. To show the changes of all the tissues or organs occurring in any major “organ disease” would have vitiated the systematic presentation used here and would have been too repetitive. Occasionally, however, when a particularly suitable opportunity offered itself, we have emphasized the natural history of a disease and have tried to point out what other characteristic changes could be expected with a given basic pathologic lesion. The chapter on neuropathology lent itself particularly well to this approach.

We do not hold with the division of our subject into “macroscopic” and “microscopic” pathology. That courses in pathological histology are abundantly justified and have proved their value is not the issue here; nor can demonstrations in pathological anatomy be limited to the macroscopic changes. A successful course of demonstrations, like the clinico-pathological conferences so important in medical education, must fully integrate the macroscopic and microscopic findings. This, precisely, has been our aim. The macroscopic changes can be understood only on the basis of the underlying fine structural alterations. Only in this way can the significance of these changes for the patient be clearly grasped.

The text of the atlas has been kept simple. All theoretical encumbrances have been avoided. Concepts like “etiology” and “pathogenesis” – defined by Doerr and Quadbeck in what we consider the only logically tenable manner – have been taken for granted<sup>1</sup>.

Whenever necessary, we have mentioned the scale of the illustrations and occasionally also the weight of the organs, so as to give an indication of the size of the specimens. We have tolerated rulers – almost obligatory components of every photograph today – only very exceptionally. We were guided by esthetic considerations only: A picture with the proportions of the “golden mean” does not tolerate any additions; it acts

as a spatial configuration, and hence must stand alone.

An atlas should guide its user; it should help him to distinguish the essential from the unimportant; it should teach him how to see, so that “seeing” will lead to “understanding”. Without a point of view there is no “Weltanschauung”, without *Θεωρία* there is no real insight. With these philosophically well-founded questions of a theory of forms is linked, surprisingly, the problem of colors. Many years ago E. Christeller suggested that Ostwald’s color charts be used in the dissecting room. Pathologists of several generations have struggled in vain with the problem of how to assess objectively the color of organs in various conditions (the reader is referred to a discussion at the Meeting of the Berlin Association of Pathologists, September 13, 1953<sup>2</sup>). A feasible method of assessing colors objectively should be as useful as the customary measuring and weighing of organs in the course of a necropsy. Such a method, however, must soon encounter its limits imposed by the problem of the psychological *Gestalt*: For a *Gestalt* – in space and in perception – is more than can be expressed by the definition of physical attributes. Perhaps this can be illustrated by asking the reader to accompany us on a little excursion into a seemingly unrelated territory, and to think of a tune so familiar to him that he can reproduce it by singing or playing it whenever he wants to. Now there is no doubt that one can also define the physical attributes of sounds, their frequencies, amplitudes, overtones, etc.; but as soon as one attempts to define a musical phrase mathematically by the frequency of vibrations of the sounds composing it, the melody is lost. A certain sequence of tones, in other words a tune, can be compared to a *Gestalt* in sound, similar to the familiar concept of the *Gestalt* in space. By attempting to assess color impressions objectively, in other words by physical means, we renounce the possibility of grasping the spatial order and attribution of organs, cut surfaces, or histological preparations, with their different colors, as a *Gestalt* in the sense of the Gestalt philosophy. We thus lose exactly what pathologists have always aimed for, namely the recognition, understanding and rational utilization, in other words the diagnostic assimilation into an image, synthesized from the spatial order of what simply can be seen.

Whoever attempts to produce a color atlas soon learns how difficult it can be to talk about colors and to convey to the printer what is intended in such a way that he understands how to adjust color gradations so



## X      What the User of the Atlas Should Know

that a particular visual impression can be achieved. To summarize briefly: we must leave it to the reader to judge how close to the original we have come in our reproductions. We have, however, endeavored to safeguard the Gestalt factor, in other words the complete image and the attribution of characteristics, so that the essence of a diagnosis can be arrived at. Wherever indicated we have tried to add some differential diagnostic comments, and to outline “stereotyped” characteristics features, with the help of which the true nature of the condition can be recognized. The late Hans Petersen of Würzburg, to whom we are all indebted for a textbook of normal histology unequalled in its beauty, once said that the process of learning could not be compared to the process of packing a large trunk. A trunk is packed layer after layer, first the lowest, then the middle, finally the up-

per layer, each in its turn. The human brain works differently: The assimilation of knowledge hinges on “foci of crystallization” – centers of concentration built up in, and by, the process of experience. But one can “experience” only what one actively pursues. The user of this atlas may at first glance through it for the sheer pleasure of looking and contemplating, but before long “foci of crystallization”, focal points of interest, will emerge, fusing in time to form a firm bridge and a clear path through the vast fields of the unknown. To know nothing is no crime. Not to want to know anything, however, is unforgivable!

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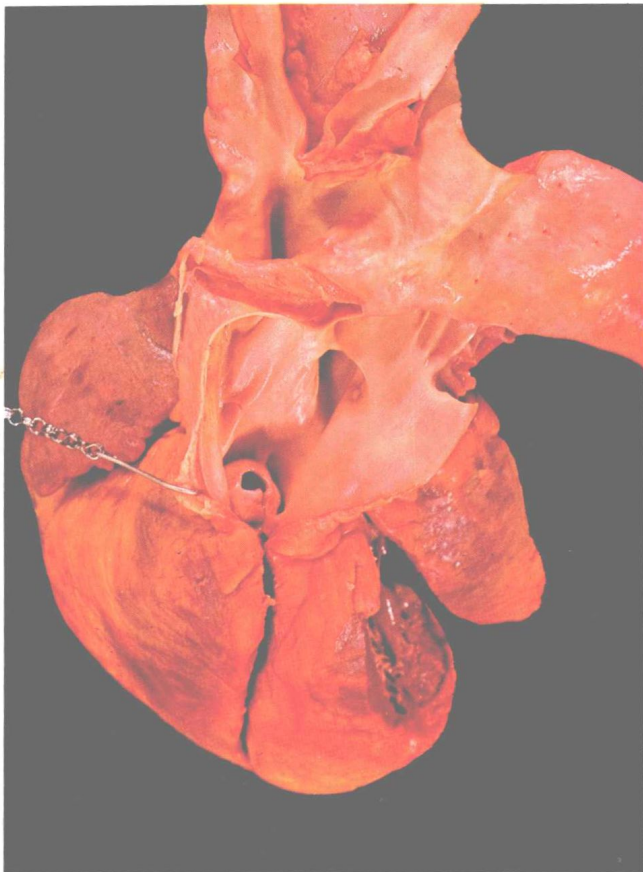
<sup>1</sup> DOERR, W., G. QUADBECK: Allgemeine Pathologie, 2nd edn., Heidelberg 1973.

<sup>2</sup> Zbl. Path. 92: 60–61, 1954.

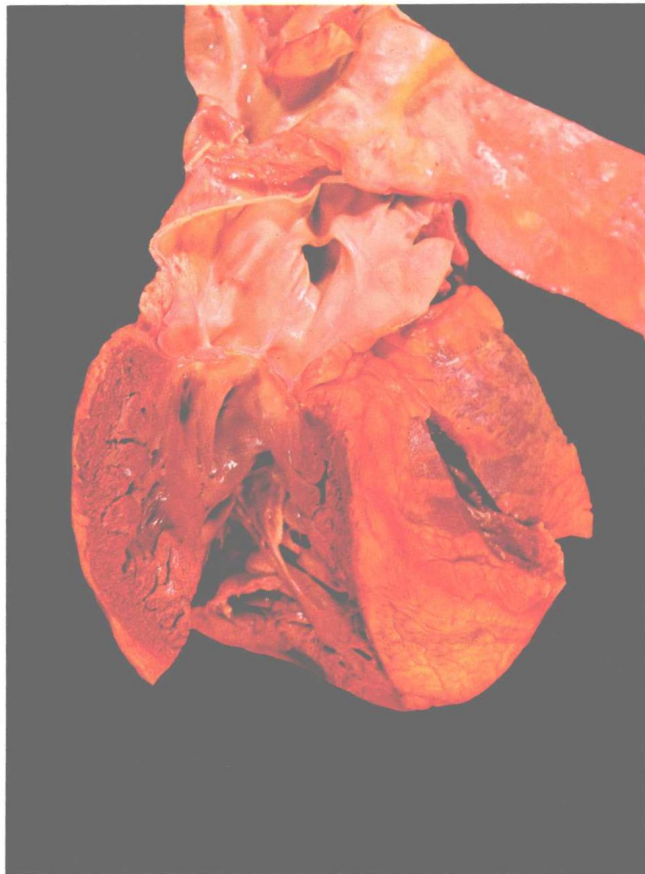
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## **Cardiovascular System**



**1 Congenital pulmonary stenosis.** 7-month-old boy. At the site of the pulmonary cusps there is a dome-shaped membrane with a central orifice. Post-stenotic dilatation of the pulmonary artery.



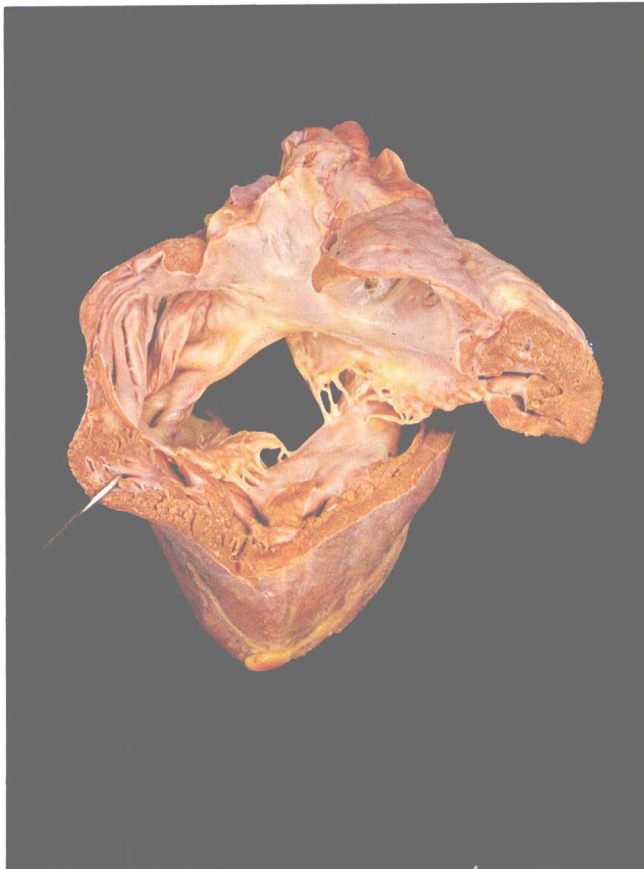
**2 Congenital pulmonary stenosis.** The heart has been opened. Massive hypertrophy of the right ventricle, which forms the cardiac apex.



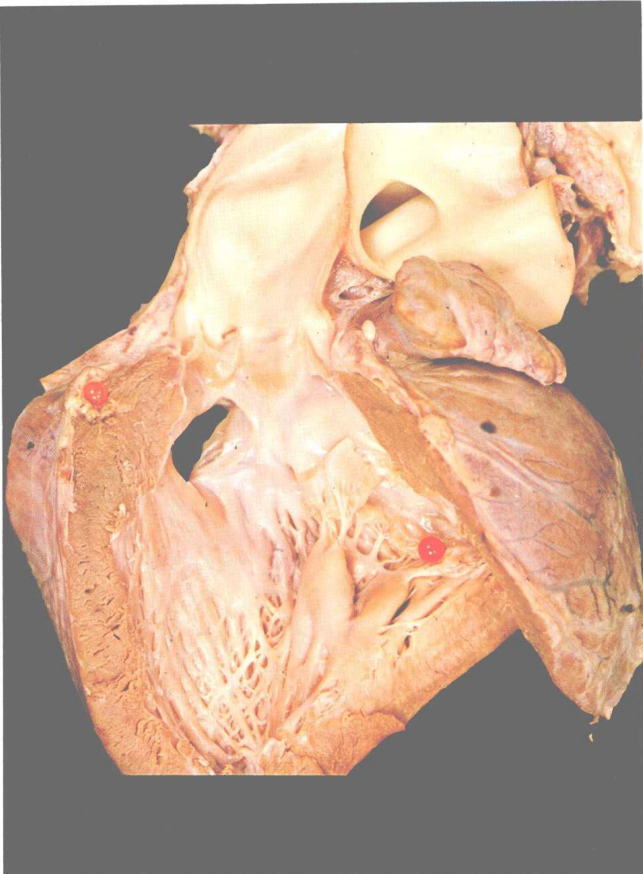
**3 Transposition of the great vessels.** The aorta (identified by the coronary ostium visible in the photograph) arises from the hypertrophied right ventricle. The ductus arteriosus, still patent, opens at the lower border of the aortic arch.

The reader of this atlas must not expect to find a systematic survey of congenital cardiac malformations. The range of teratological variants is so enormous that a special atlas would be needed to illustrate the underlying principles.

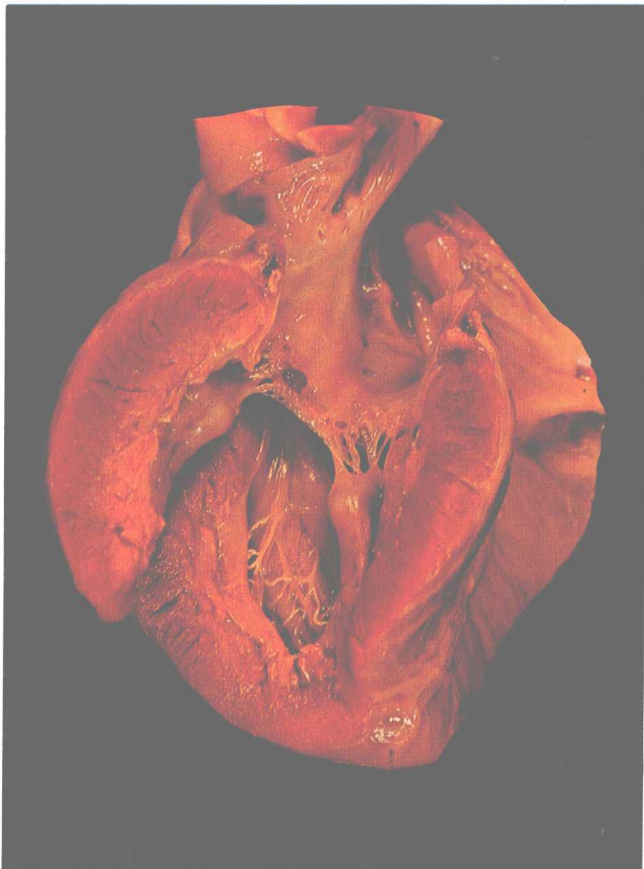




4 **Common atrioventricular (AV) cavity** (atrioventricular canal defect) viewed from the right. There is an anterior cusp and a posterior cusp, but they are not clearly differentiated. Combined right-to-left and left-to-right shunt.



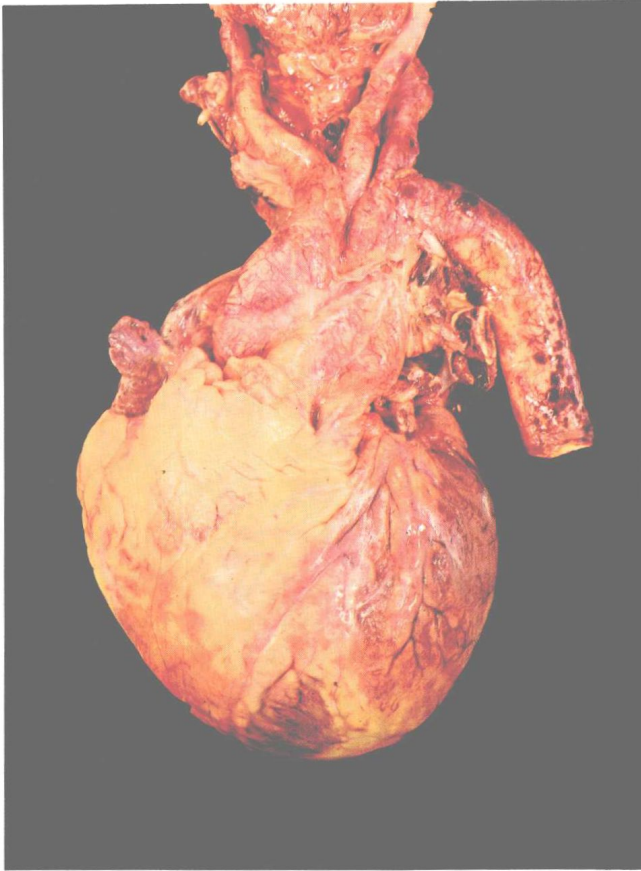
5 **Ventricular septal defect**, viewed from the left. This defect is of the ordinary type situated in the upper anterior part of the septum.



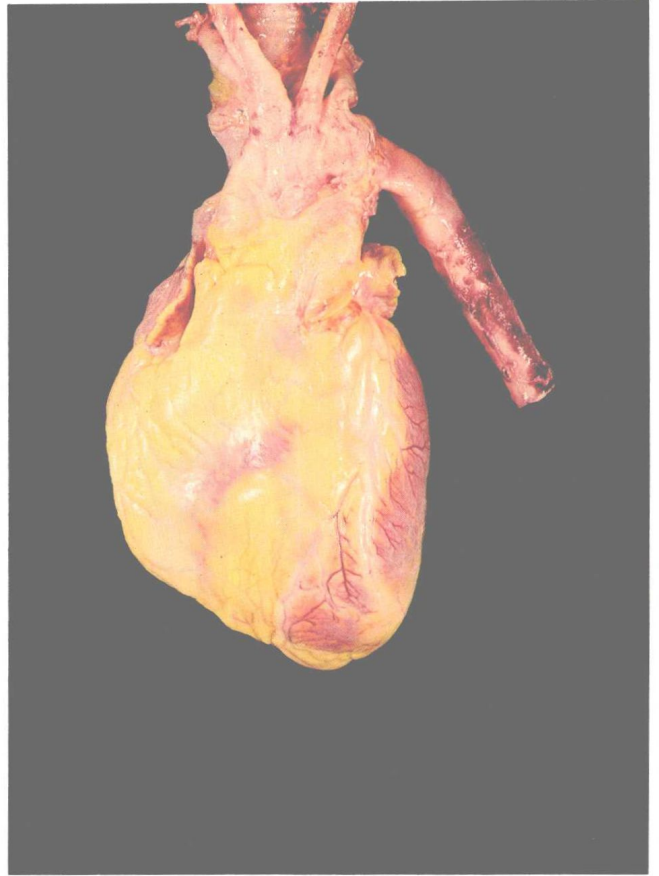
6 **Congenital blood cyst of the heart valve** in a newborn infant. A harmless condition, caused by the persistence of blood-filled endothelial channels which subsequently sclerose.



7 **Endocardial fibroelastosis**. The endocardium is white and thickened ("sugar-icing"). The fibrosis extends to the inner muscle layers.



**8 Hypertrophy of the entire heart** in a case of essential hypertension. 70-year-old man, heart weight 790 g.



**9 Normal heart.** 20-year-old athletic man killed in a traffic accident (see also Fig. 38).

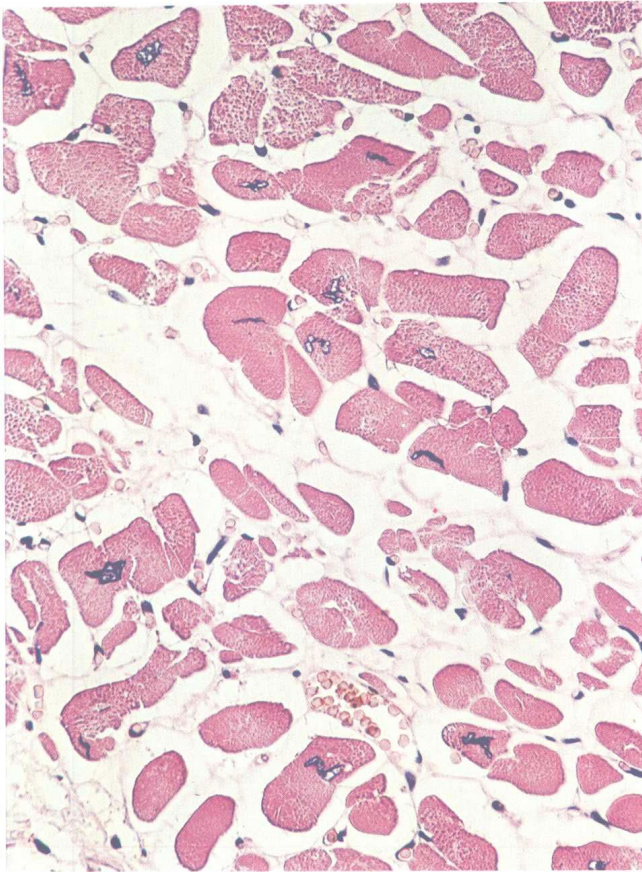


These three illustrations should be compared. Normally the anterior wall of the heart is made up mainly of the right ventricle, but in hypertension the heart is rotated on its longitudinal axis in such a way that the anterior wall of the left ventricle is shifted ventrally.

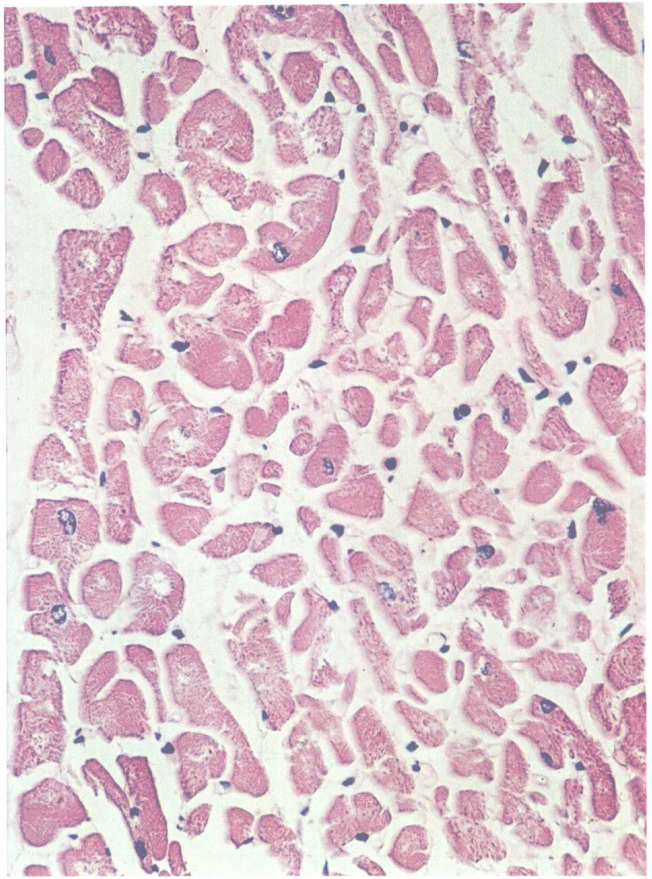
**10 Atrophy of the heart in cachexia.** This 60-year-old man had a carcinoma of the larynx which had ulcerated through the skin of the neck (visible in the upper part of the photograph). Heart weight 210 g. Note the relatively increased width of the aorta in relation to the shortened longitudinal axis of the heart.

Figs. 8, 9 and 10 were photographed at the same camera setting, so that the dimensions and shapes of the hearts are comparable.



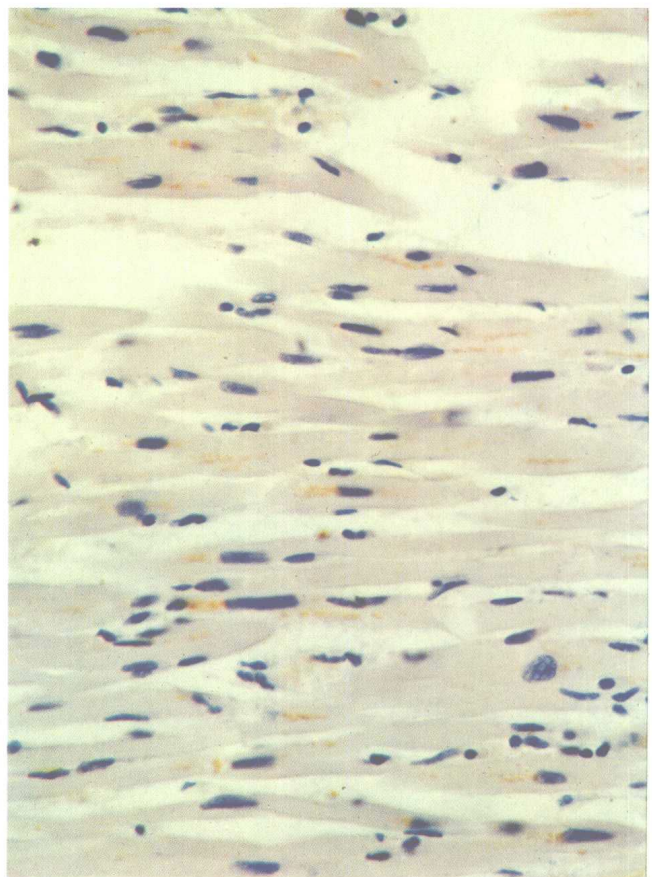


**11 Hypertrophy of the heart.** The muscle fibers, here seen in cross-section, are enlarged and have hyperchromatic nuclei with an irregular angular outline. The latter finding is extremely characteristic. 70-year-old man. HE, 300x.

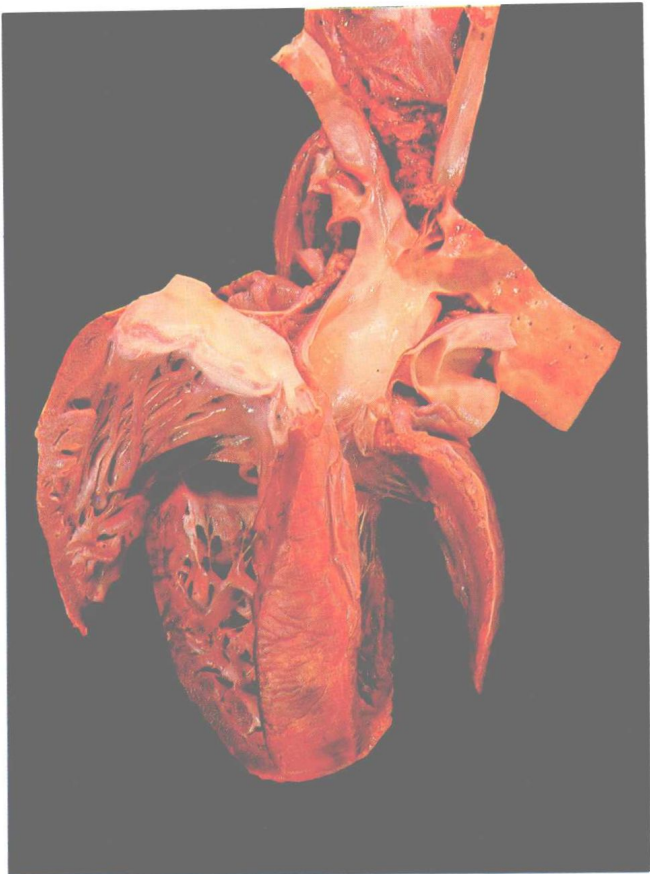


**12 Normal heart.** The muscle fibers are not thickened. The nuclei are round or oval in cross-section, and are not hyperchromatic. 20-year-old man. HE, 300x.

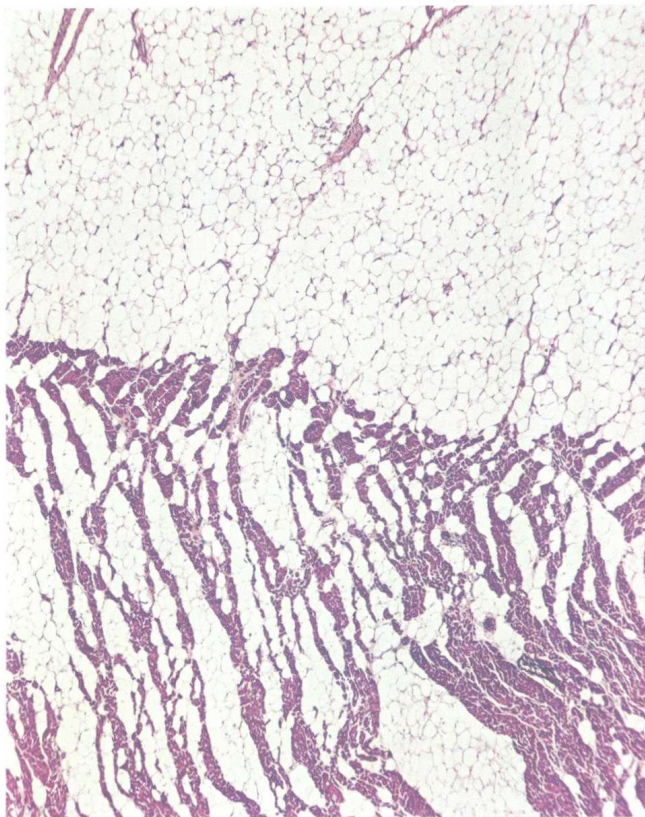
**13 Brown atrophy of the heart.** Deposits of brownish-yellow lipofuscin pigment in fine granules at the nuclear poles. Tests for iron are negative. Hemalum, 350x. At present it is doubted whether excessive lipofuscin deposition can alone satisfactorily account for the development of cardiac failure. Scrutiny of larger areas of myocardium shows that the pigment deposition has a regular pattern, similar to the thrush's breast or tabby-cat striation seen in fatty change.



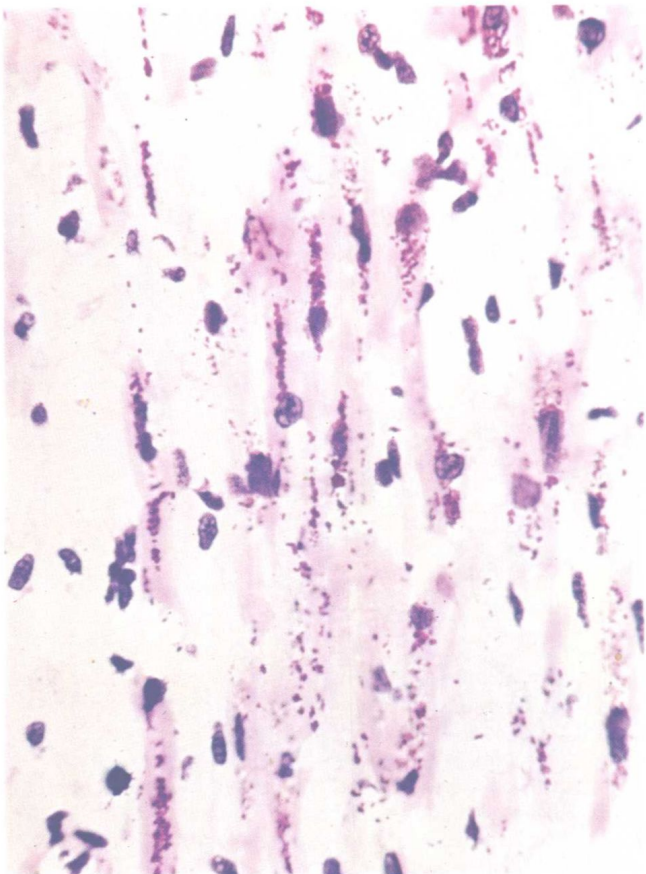




**14    Advanced right ventricular hypertrophy** in a case of primary pulmonary hypertension. Pronounced thickening of muscle trabeculae. 20-year-old man. Cor pulmonale in association with stenosis of small pulmonary arteries.

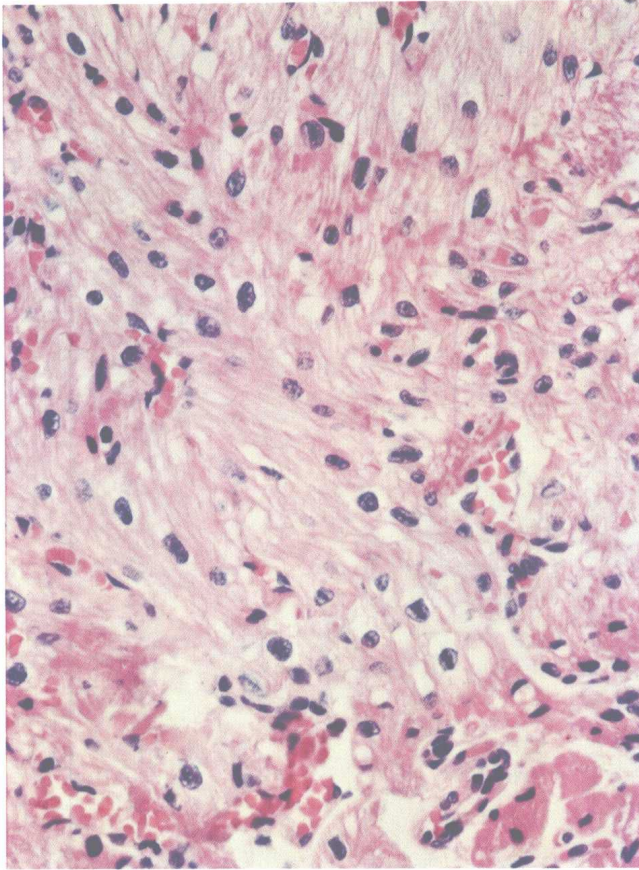


**15    Fatty infiltration of the heart.** Strands and islets of adipose tissue have infiltrated the myocardium, especially in the right ventricle. Normal subepicardial fat is seen above. HE, 25x.

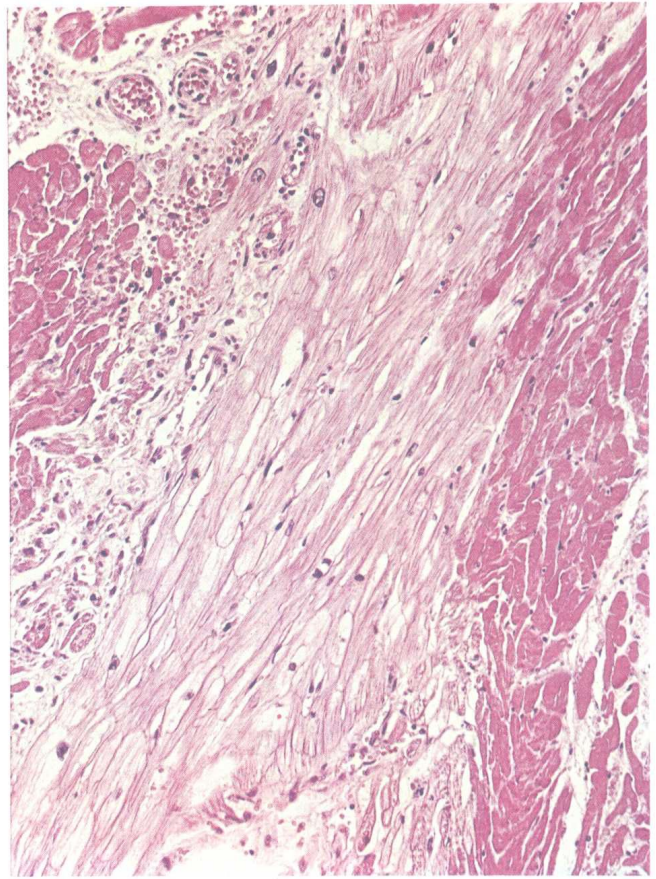


**16    Brown atrophy of the myocardium.** The lipofuscin granules have been stained with thiacarbocyanine bromide. 400x.

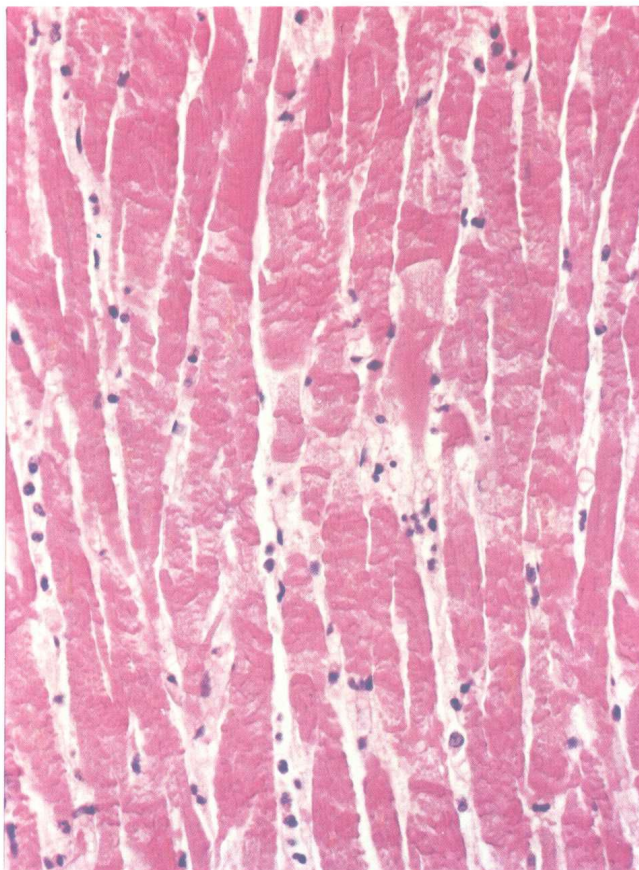




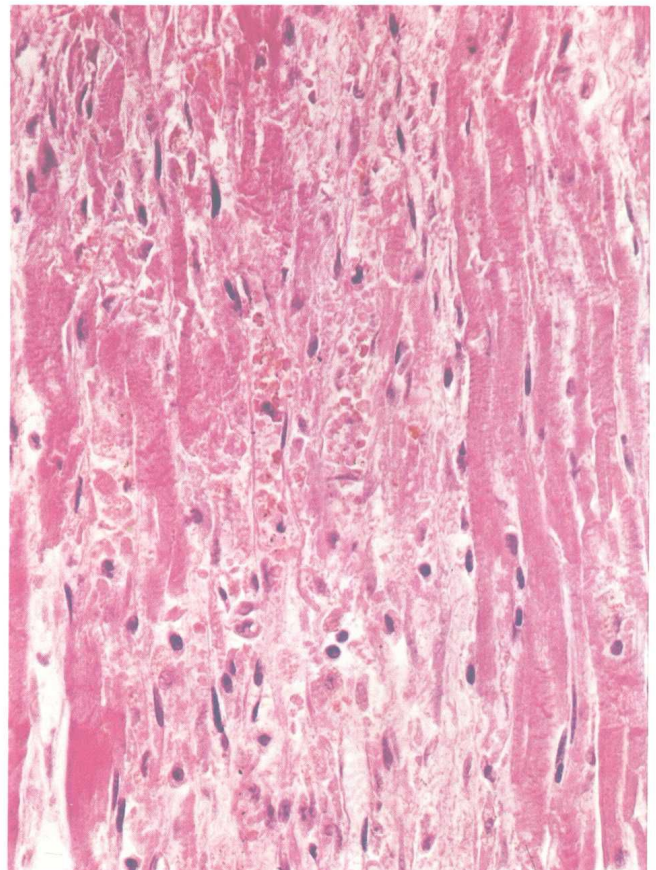
17 Vacuolization of myocardial fibers due to hypoxia. HE, 350x.



18 Hypoxic myocardial damage. Empty sarcolemmal sheaths. HE, 160x.



19 Hyaline banding. Severe damage to myocardial fibers due to oxygen deficiency, catecholamine excess, etc. HE, 300x.



20 Coagulative necrosis of myocardial fibers caused by oxygen deficiency plus toxic-inflammatory factors. HE, 300x.