

MOGENS S. NORN

# External Eye

Methods of  
Examination

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# List of Contents

## Preface . 9

## I . Examinations by simple aids . 11

### *External inspection . 11*

Position of Eyelids . 11

Position of Eyeball . 12

Strabismus . 12

Eversion of Eyelid . 12

Cornea . 14

Sclera . 14

### *Pencil lamp and magnifier . 15*

### *Ultraviolet hand lamp . 16*

### *Linear measurements . 17*

Corneal Diameter . 18

Interpupillary Distance . 20

Size of Pupil . 22

Area of Conjunctival Sac . 22

### *Palpebral strength . 22*

Straub's Eyelid Dynamometer . 23

Miller's Contact Lens Pressure

Transducer . 23

## II . Measurement of exophthalmos . 24

### *Principles . 25*

### *Luedde's rod . 25*

Sources of Error . 26

Normal Eyes . 27

### *Hertel's apparatus . 28*

Sources of Error . 30

Normal Eyes . 31

### *Davanger's exophthalmometer . 31*

### *Radiographic exophthalmometry . 32*

Human exophthalmometry . 32

Sources of Error . 32

Accuracy of Measurement . 33

Normal Eyes . 33

### *Volumetric exophthalmometry . 33*

### *Orbitonometry . 34*

Comments . 34

## III . Slit-lamp examination . 35

### *Principle . 35*

Aids . 36

Adjustment . 37

### *Lighting . 38*

Diffuse Lighting . 38

Direct Lighting . 38

Indirect Lighting . 40

Retrograde Lighting . 42

Specular Reflection . 42

Transillumination of Iris . 43

Chamber Angle Estimation . 45

Sclerotic Scatter . 46

Coloured Light . 46

Polarized Light . 47

### *Lowe's recurrent erosion test . 49*

### *Measurement in slit lamp . 49*

### *Photo slit lamp . 49*

Fluorescence-angiography . 50

## IV . Examination after vital staining . 51

### *Historical data . 51*

### *Vital staining - general remarks . 51*

*Fluorescein* . 52

Specificity . 52

Time Factor . 53

Normal Eyes . 53

Pathological Cases . 55

*Rose bengal* . 55

Specificity . 57

Time Factor . 58

Normal Eyes . 58

Pathological Cases . 60

*Fluorescein – rose bengal*

*mixture* . 62

Normal Eyes . 63

Pathological Cases . 64

Indication . 65

Contra-Indication . 65

*Alcian blue* . 66

Specificity . 66

Normal Eyes . 66

Pathological Cases . 66

*Tetrazolium* . 66

Normal Eyes . 67

Pathological Cases . 67

*Tetrazolium – alcian blue*

*mixture* . 68

Specificity . 68

Normal Eyes . 68

Pathological Cases . 68

Indication . 69

Contra-indication . 69

*Other vital stains* . 70

Trypan Blue . 70

Bromothymol Blue . 71

Fluorexon . 71

Sudan III . 72

*Comments* . 72

## V . Studies of Surface

phenomena . 73

*Surface tension* . 74

*Foam Formation* . 74

*Interference phenomenon* . 75

*Corneal gloss* . 75

*Break-up time (Wetting time)* . 76

Method . 76

Sources of Error . 77

Normal Eyes . 77

Pathology . 77

*Dry spots* . 78

Pathology . 78

*Dellen* . 78

*Schweitzer's fluorescein pattern* . 80

Principle . 81

Method . 81

Errors . 83

Normal Eyes . 83

Pathological Cases . 83

*Comments* . 84

## VI . Measurement of corneal thickness . 85

Principle . 85

Method . 86

Sources of Error . 88

Normal Eyes . 88

Pathological Cases . 89

## VII . Measurement of corneal curvature . 91

*Javal's keratometer* . 92

Principle . 92

Method . 92

Errors . 93

*Topogometer* . 93

*Photokeratometer* . 95

*Comments* . 95

## VIII . Tear function studies . 97

*Tear secretion* . 98

Classification . 99

*Schirmer's test I* . 99

Errors of the Method . 101

Normal Eyes . 101

*Schirmer's test II* . 102

*Basal Schirmer test* . 102

*Dye dilution tests* . 103

*Lacrimal river dilution test* . 103

Sources of Error . 104

Advantages . 105

Normal Eyes . 105

Pathological Cases . 105

*Rose bengal vital staining* . 106

Sources of Error . 107

Accuracy . 108

Normal Eyes . 108

Pathological Cases . 109

Comments . 109

*Outflow of tears* . 109

*Washing through of lacrimal system* . 109

Sources of Error . 111

Probing of Lacrimal Passages . 111

*Taste tests* . 112

*Dye outflow tests* . 113

*Canaliculus tests* . 114

*Pressure in nasolacrimal system* . 116

*Radiography* . 116

*Chemical constituents of tears* . 117

*Protein content* . 117

*Enzymes* . 118

Lysozyme . 118

Fibrinolytic Factor . 119

Collagenase Activity . 119

*Glucose* . 119

*Hydrogen ion concentration* . 120

*Lacrimal river pH test*  
(bromothymol blue) . 121

Comments . 122

## IX . Mucus function studies . 123

*Quality* . 124

Pathological Cases . 124

*Quantity* . 125

Filter-Paper Micromethod . 125

Mucous Thread in Fornix . 126

Normal Eyes . 126

Pathological Cases . 127

*Mucus flow* . 128

Method . 128

Normal Eyes . 129

Pathological Cases . 129

Comments . 129

## X . Temperature measurement . 130

*Direct measurement* . 130

*Bolometry* . 131

Normal Eyes . 131

Pathological Cases . 131

*Thermography* . 131

Pathological Cases . 131

## XI . Measurement of sensitivity . 133

*Cochet & Bonnet's aesthesiometer* . 134

Method . 134

Sources of error . 136



*Normal eyes* . 137

*Pathological cases* . 139

*Comments* . 141

## XII . Conjunctivo-cytologic studies . 142

*Scrapings* . 142

*Fixation* . 143

*Staining* . 144

*Normal Eyes* . 145

*Pathological Cases* . 145

*Quantitative pipette method* . 151

*Apparatus* . 151

*Procedure* . 151

*Staining* . 153

*Formolfuchsin-Eosin* . 153

*Counting Technique* . 153

*Normal Eyes* . 154

*Pathological Cases* . 154

*Comments* . 156

## XIII . Biopsy of conjunctiva . 157

*Method* . 157

*Procedure* . 157

*Fixation* . 158

*Staining* . 158

*Normal eyes* . 159

*Epithelium* . 159

*Connective Tissue* . 159

*Pathological cases* . 161

*Cystinosis* . 161

*Amyloidosis* . 162

*Tumours* . 162

## *Comparison of biopsy and cytology* . 162

*Biopsy* . 162

*Scraping* . 163

*Quantitative Pipette* . 163

## XIV . Microbiological studies . 165

*Bacteria cultivation* . 165

*Method* . 165

*Normal Eyes* . 166

*Pathological Cases* . 167

*Resistance Pattern* . 168

*Fungi cultivation* . 170

*Normal Eyes* . 171

*Pathological Cases* . 172

*Search for virus* . 172

*Herpes Simplex* . 172

*Molluscum Contagiosum* . 173

*Adenovirus* . 173

*Chlamydia* . 173

*Search for protozoa and metazoa* . 175

*Flagellates* . 175

*Microfilaria* . 175

*Phthirus Pubis* . 175

*Demodex Folliculorum et Brevis* . 175

*Method* . 176

*Normal Eyes* . 176

*Pathological Cases* . 178

## **Bibliography** . 179

## **Subject index** . 195

# Preface

A good examination technique serves as an important weapon in the fight against diseases of the external eye.

In the daily routine we often meet with complaints concerning the external eye. One patient complains of smarting pain, itching, or a sensation of grains of sand in the eye, without any physical abnormality being demonstrable. Another complains of overflow of tears, and a third of dryness.

Examination of the external eye is particularly important to-day, after wearing of contact lenses and corneal transplantations have become so relatively common.

Which are the appropriate examinations to be carried out in such cases? How far should we go and what do we gain?

An abundance of examination methods exists, some advanced and complex, others simple.

The object of the present work has been to select and describe some of the most important methods. I have concentrated particularly on methods giving as comprehensive clinical information as possible in the most economical manner (economical with regard to time and apparatus).

First the principles of the individual methods are described, and then their details. Further – where possible – the accuracy of the method has been assessed, and sources of error are mentioned. Studies of normal materials are reported, and pathological values are specified. Indications and possible contra-indications are stated.

The book is in the first place intended for ophthalmologists and prospective ophthalmologists. However, contact lens opticians and others may also find chapters of particular interest to them.

I wish to thank professor Poul Brændstrup for inspiring discussions, Lis Borgeskov for practical help, Elisabeth Aagesen for the translation, Mogens Falck for the photos of instruments and Jørgen Lund for the drawings.

*Mogens Stig Norn*

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Mogens Stig Nørre

# I. Examinations by simple aids

*Her eyes were as dark and deep  
as woodland lakes -*

When humans communicate they most often look at each other's faces especially at the eyes and eye surroundings. The eye is the mirror of the soul. A wandering, shifty glance raises suspicion of a furtive, unreliable person.

In dogs the sense of smell plays a much greater part than the sight. Dogs therefore often communicate anally.

The central rôle of the eye and its surrounding causes even minor alterations to be easily recognized. External inspection is an important examination, which ought to disclose even minor defects (mild oedema, a small atheroma), such being often of considerable relevance to the patient.

External inspection prior to detailed examinations with more advanced equipment is a wise procedure. Examination without aids yields important diagnostic data, so to speak gratuitously.

## External inspection

The eyes and eye surroundings are inspected with the patient within conversational range: Skin (tumours, xanthelasmata, zoster, oedema, eczema, blepharochalasis, blepharitis), position of eyelids (ptosis, entropion, ectropion, epicanthus, blepharophimosis), position of eyeball (exophthalmos, enophthalmos), strabismus, eye movements, facial nerve palsy, cornea (cosmetically disfiguring cicatrices), sclera (jaundice, melanosis).

Then follows inspection of details, and, finally, further examinations (in slit lamp etc.).

A pencil lamp may be used for illumination.

### Position of Eyelids

Unilateral ptosis is most easily detected by simple inspection. Measurement of the height of the palpebral fissure is a less reliable procedure. The position of the upper lid is described in relation to the cornea with the patient's eyes directed straight forwards (normally touching a line between the upper and middle one-third of the cornea).

*Entropion* may be so slight that the diagnosis is missed unless one lets the patient squeeze the lids hard repeatedly.

*Ectropion* causes epiphora, even if so slight that only the lower punctum lacrimale is everted. The position of the punctum lacrimale must be closely inspected.

### **Position of Eyeball**

Unilateral exophthalmos is more reliably diagnosed by inspection than by ordinary exophthalmometry (Chapter II). Initial ocular changes in Graves' disease can be disclosed by presence of an uncovered scleral area above the cornea on looking forward (Dalrymple's sign), and by tardy movement of the upper lid on looking downward (Graefe's sign). These phenomena are due to increased sympathetic nerve tone and may be seen prior to the onset of proper exophthalmos.

In exophthalmos it is important to make out whether the eyeball is displaced axially or in a certain direction (localized tumour).

### **Strabismus**

Pronounced strabismus is detectable by inspection. Attention must, however, be called to the fact that a broad nose bridge and epicanthus may give a false impression of inward squint (pseudostabismus).

The corneal reflection of light is studied by letting the patient fixate a pencil lamp at a distance of 30–40 cm. If displaced temporally in the squinting eye, convergent strabismus is present (the other eye fixates the lamp with a central corneal reflection of light). A light-spot displacement to the limbus corneae corresponds to a 45 degrees squint angle (*Hirschberg's test*).

This test should, however, be followed by a cover-test, for one thing to ensure that the slightly decentered corneal light reflection might not be due to a gamma angle (the angle between the fixation axis and the optic axis through the centre of the cornea).

### **Eversion of Eyelid**

The lower lid is easily everted by drawing its skin downwards, with consequent exposure of the inferior fornix.

It is more difficult to inspect the superior fornix and the superior tarsus. This region is of particular interest, because it may conceal foreign bodies. Further, the region contains crypt systems of mucus-producing goblet cells (Kessing) and lymphoid tissue (mascara pigmentation is found particularly within this region). Allergic papilla formation takes place in this area, where a certain degree of physiological papilla formation is known to exist.



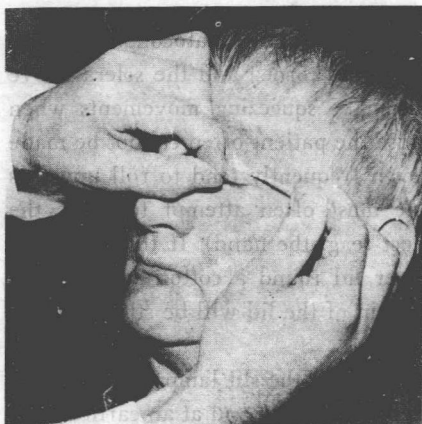
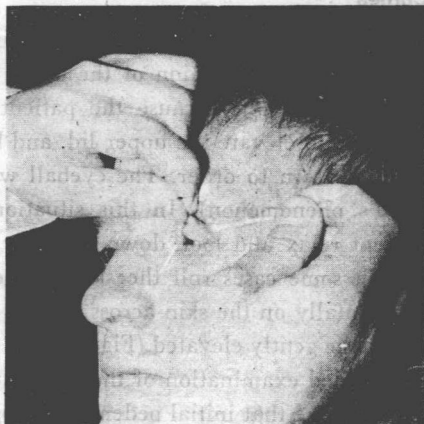


Fig. 1,1 Eversion of the upper lid.



The upper lid is everted by hand or by a stick (cotton swab, glass rod, match, or the like) as axis, the stick being placed on the lid along the upper border of the superior tarsus (Fig. 1,1).

A more satisfactory barring of the region is obtained by eversion over Desmarres' elevator (Fig. 1,2).

The *lacrimal gland* is best inspected by pulling the upper lid out and upwards while the eye is directed down and nasally. We may then see the lower pole of the palpebral lobe of the gland and some of the outlets, situated just above the lateral palpebral ligament.

Fig. 1,2 Eversion of the upper lid by Desmarres' elevator.



## Cornea

The cornea is inspected for opacity, invasion of vessels, keratoconus, wounds, abscesses, etc. Inspection of the upper part of the cornea and the sclera above may be difficult, because the patient will make squeezing movements when one tries to elevate the upper lid, and because the patient often cannot be made to look down to order. The eyeball will even frequently tend to roll upwards (Bell's phenomenon). In this situation one must often attempt to make the patient relax and look down at a low object (e. g. the hand). If this fails, one can in some cases roll the skin of the upper lid round a cotton swab placed horizontally on the skin across the lid. The skin of the lid will be stretched and the lid be gently elevated (Fig. I,3).

Detailed examination of the cornea takes place in the slit lamp (Chapter III). It is strange that initial oedema is recognized more easily and at an earlier stage by gross examination (sclerotic scatter (Chapter III)) than in the slit lamp with its high magnification.

Irregularities of the corneal surface can be disclosed by reflection. The mirror image of the pencil lamp becomes irregular, when passing over an uneven area of the cornea (Placido's disc, see Chapter VII).

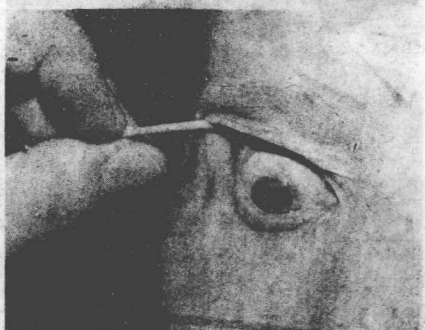
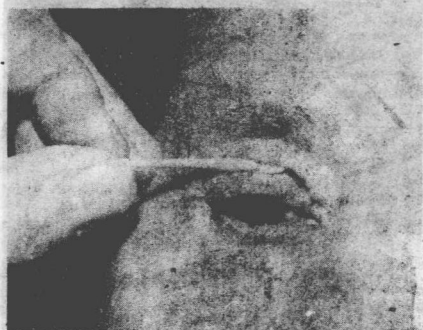
## Sclera

The sclera is inspected for hyperaemia (ciliary, episcleritis, scleritis) and discoloration (melanosis, argyrosis, epinephrine-discoloration, ochronosis).

*Scleral jaundice* is due to an increased amount of bile pigments in the blood, from where it penetrates into the tissue. Such yellow discoloration is best detected by inspection in daylight.

*Blue sclerotics* may be a constituent sign of congenital bone fragility.

Fig. I,3 Inspection of the upper part of the cornea and the sclera above by rolling skin round a cotton swab across the lid.



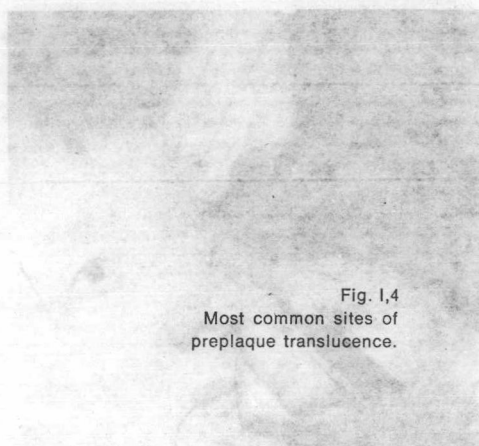


Fig. I,4  
Most common sites of  
preplaque translucence.

		Plaque	Preplaque
○	○	29	11
●	○	13	0
○	●	28	44
●	○	4	2
○	○	1	1
●	○	11	8
●	○	2	3
●	○	13	31

*Preplaques* are due to a greyish translucence of the choroid owing to transparency of the sclera. The phenomenon is only recognizable by gross examination with a pencil lamp, whereas it disappears on examination in the slit-lamp magnification and light.

It is, in other words, *an optic phenomenon that is best recognized by a primitive examination technique*, being apparently invisible in the slit lamp.

Preplaques are a normal phenomenon in elderly individuals. A preplaque is an about 1 mm broad greyish streak running a vertical course across the insertion of a muscle in its entire breadth. Such are only found in front of the horizontal muscles, most often the rectus medialis, Fig. I,4.

The rising incidence with increasing age is shown in Table I (Chapter III). Preplaques constitute a precursor of scleral plaques, which represent an additional transparency within the preplaque region (Chapter III).

Grossly recognized scleral translucence may occur as an irregular zone outside the typical sites of preplaques. Such translucence is pathological. It may be due to episcleritis or be a consequence of surgical diathermy (retinal detachment).

## Pencil lamp and magnifier

Fig. I,5 illustrates examination by pencil lamp and magnifying lens. It is necessary to focus the lens at exactly the point to be examined, and equally necessary to direct the central rays of the lamp on the same spot. This gives a sharp and well-lit image. The lamp should be held as close to the eye as possible, and its bulb should have the form of a lens to obtain a small, concentrated bright spot of light.

11	29	○	○
0	18	○	○
24	28	○	○
5	4	○	○
1	1	○	○
8	11	○	○
3	5	○	○
31	13	○	○



Fig. 1.5

Examination by pencil lamp and magnifying lens.

## Ultraviolet hand lamp

Such are used for examining the fluorescein-stained tear film between cornea and contact lens at control or fitting of contact lenses.

The apparatus consists of a glass magnifying twice. A small, built-in lens allows optional magnification  $\times 5$ . The apparatus has two built-in ultraviolet lamps and, at option, two white fluorescent tubes (Fig. 1.6).

2% fluorescein is instilled after insertion of the contact lens. The eye is then

Fig. 1.6

Ultraviolet hand lens.

