

THE NETTER COLLECTION

of MEDICAL ILLUSTRATIONS

Frank H. Netter, MD

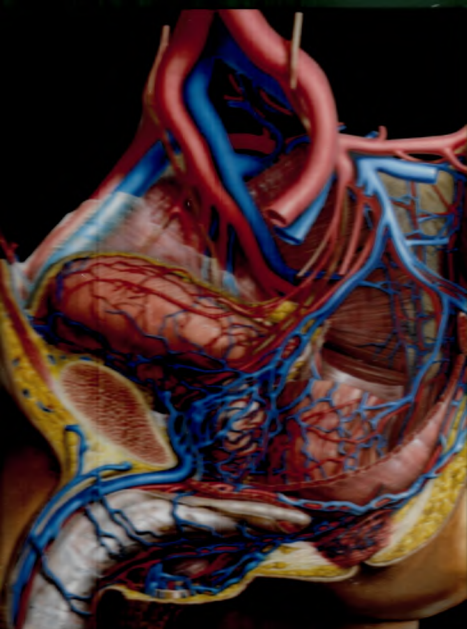
*F. Netter
M.D.*



Enhanced
DIGITAL
VERSION
Included

3

THIRD EDITION



VOLUME 1

ROGER P. SMITH
PAUL J. TUREK

Reproductive System



THE NETTER COLLECTION OF MEDICAL ILLUSTRATIONS

Reproductive System

3rd Edition

Compilation of paintings prepared by **FRANK H. NETTER, MD**

VOLUME 1

Edited by

Roger P. Smith, MD

Adjunct Professor, Department of Obstetrics and Gynecology

Virginia Tech Carilion School of Medicine

Roanoke, Virginia

Paul J. Turek, MD

Director, The Turek Clinic

Former Professor and Endowed Chair

University of California, San Francisco

San Francisco, California

Additional Illustrations by

Carlos A.G. Machado, MD

CONTRIBUTING ILLUSTRATORS

John A. Craig, MD

Tiffany S. DaVanzo, MA, CMI

DragonFly Media

Paul Kim, MS

Kristen W. Marzejon, CMI

James A. Perkins, MS, MFA



785831

Universitatea de Stat de Medicină și Farmacie
„Nicolae Testemițanu”
BIBLIOTECA
ȘTIINȚIFICĂ MEDICALĂ

SLH

Self portrait by Dr. Netter

SECTION 1 DEVELOPMENT OF THE GENITAL TRACTS AND FUNCTIONAL RELATIONSHIPS OF THE GONADS

- 1.1 Genetics and Biology of Early Reproductive Tract Development, 2
- 1.2 Homologues of Internal Genitalia, 3
- 1.3 Homologues of External Genitalia, 4
- 1.4 Testosterone and Estrogen Synthesis, 5
- 1.5 Hypothalamic-Pituitary-Gonadal Hormonal Axis, 6
- 1.6 Puberty: Normal Sequence, 8
- 1.7 Puberty: Abnormalities in Males, 10
- 1.8 Puberty: Causes of Male Sexual Precocity, 11
- 1.9 Puberty: Causes of Male Sexual Precocity (Continued), 12
- 1.10 Puberty: Female Gonadal Failure, 13
- 1.11 Puberty: Causes of Female Precocity, 14
- 1.12 Sex Development: True Intersex, 15
- 1.13 Intersex: Male Gonadal, 16
- 1.14 Intersex: Male Hormonal, 17
- 1.15 Intersex: Female, 18

SECTION 2 PENIS AND MALE PERINEUM

- 2.1 Pelvic Structures, 20
- 2.2 Superficial Fascial Layers, 21
- 2.3 Deep Fascial Layers, 22
- 2.4 Penile Fasciae and Structures, 23
- 2.5 Urogenital Diaphragm, 24
- 2.6 Blood Supply of Pelvis, 25
- 2.7 Blood Supply of Perineum, 26
- 2.8 Blood Supply of Testis, 27
- 2.9 Lymphatic Drainage of Pelvis and Genitalia, 28
- 2.10 Innervation of Genitalia, 29
- 2.11 Innervation of Genitalia and of Perineum, 30
- 2.12 Urethra and Penis, 31
- 2.13 Erection and Erectile Dysfunction, 32
- 2.14 Hypospadias and Epispadias, 33
- 2.15 Congenital Valve Formation and Cyst, 34
- 2.16 Urethral Anomalies, Verumontanum Disorders, 35
- 2.17 Phimosis, Paraphimosis, Strangulation, 36
- 2.18 Peyronie Disease and Priapism, 37
- 2.19 Trauma to Penis and Urethra, 38
- 2.20 Urinary Extravasation, 39
- 2.21 Balanitis, 40
- 2.22 Urethritis, 41
- 2.23 Syphilis, 42
- 2.24 Chancroid, Lymphogranuloma Venereum, 43
- 2.25 Granuloma Inguinale, 44
- 2.26 Strictures, 45
- 2.27 Warts, Precancerous Lesions, Early Cancer, 46
- 2.28 Advanced Carcinoma of the Penis, 47
- 2.29 Papilloma, Cancer of Urethra, 48

SECTION 3 SCROTUM AND TESTIS

- 3.1 Scrotal Wall, 50
- 3.2 Blood Supply of the Testis, 51
- 3.3 Testis, Epididymis, and Vas Deferens, 52
- 3.4 Testicular Development and Spermatogenesis, 53
- 3.5 Descent of the Testis, 54
- 3.6 Scrotal Skin Diseases: Chemical and Infectious, 55
- 3.7 Scrotal Skin Diseases: Scabies and Lice, 56
- 3.8 Avulsion, Edema, Hematoma, 57
- 3.9 Hydrocele, Spermatocoele, 58
- 3.10 Varicocele, Hematocele, Torsion, 59
- 3.11 Anomalies of the Spermatic Cord, 60
- 3.12 Infection, Gangrene, 61

- 3.13 Syphilis, 62
- 3.14 Elephantiasis, 63
- 3.15 Cysts and Cancer of the Scrotum, 64
- 3.16 Cryptorchidism, 65
- 3.17 Testis Failure: Primary (Hypergonadotropic) Hypogonadism, 66
- 3.18 Testis Failure: Secondary (Hypogonadotropic) Hypogonadism, 67
- 3.19 Testis Failure: Secondary Hypogonadism Variants, 68
- 3.20 Testis Failure: Klinefelter Syndrome, 69
- 3.21 Testis Failure: Delayed Puberty, 70
- 3.22 Spermatogenic Failure, 71
- 3.23 Infection and Abscess of Testis and Epididymis, 72
- 3.24 Syphilis and Tuberculosis of the Testis, 73
- 3.25 Testicular Tumors: Seminoma, Embryonal Carcinoma, Yolk Sac Tumors, 74
- 3.26 Testicular Tumors: Teratoma, Choriocarcinoma, In Situ Neoplasia, 75

SECTION 4 SEMINAL VESICLES AND PROSTATE

- 4.1 Prostate and Seminal Vesicles, 78
- 4.2 Development of Prostate, 79
- 4.3 Seminal Vesicle Agenesis, 80
- 4.4 Pelvic and Prostatic Trauma, 81
- 4.5 Prostatic Infarct and Cysts, 82
- 4.6 Prostatitis, 83
- 4.7 Prostatic Tuberculosis and Calculi, 84
- 4.8 Hematospermia, 85
- 4.9 Ejaculatory Duct Obstruction, 86
- 4.10 Seminal Vesicle Surgical Approaches, 87

SECTION 5 SPERM AND EJACULATION

- 5.1 Anatomy of a Sperm, 90
- 5.2 Semen Analysis and Sperm Morphology, 91
- 5.3 Oligospermia: Sperm Production Problems—Genetic and Epigenetic, 92
- 5.4 Oligospermia: Sperm Production Problems—Hormonal and Acquired, 93
- 5.5 Asthenospermia: Genetic and Acquired Causes, 94
- 5.6 Azoospermia: Sperm Production Problems—Genetic and Acquired Causes, 95
- 5.7 Azoospermia: Excurrent Duct Obstruction, 96
- 5.8 Azoospermia: Diagnostic Procedures, 97
- 5.9 Azoospermia: Reproductive Microsurgery, 98
- 5.10 Vasectomy, 99
- 5.11 Therapeutic Sperm Retrieval, 100
- 5.12 Ejaculatory Disorders, 101
- 5.13 Paternal Age Effects on Offspring, 102

SECTION 6 VULVA

- 6.1 External Genitalia, 104
- 6.2 Pudendal, Pubic, and Inguinal Regions, 105
- 6.3 Perineum, 106
- 6.4 Lymphatic Drainage: External Genitalia, 107
- 6.5 Blood Supply of Perineum, 108
- 6.6 Innervation of External Genitalia and Perineum, 109
- 6.7 Dermatoses: Folliculitis, Sebaceous Cysts, Herpes, Tinea Cruris, Psoriasis, 110
- 6.8 Dermatoses: Acne Inversa, Contact Dermatitis, Intertrigo, Aphthous Ulcer, 111
- 6.9 Atrophic Conditions, 112
- 6.10 Circulatory and Other Disturbances, 113
- 6.11 Vulvar Trauma and Lacerations, 114
- 6.12 Diabetes, Trichomoniasis, Moniliasis, 115

- 6.13 Vulvodynia, 116
- 6.14 Gonorrhea, 117
- 6.15 Syphilis, 118
- 6.16 Chancroid and Other Infections, 119
- 6.17 Cysts, 120
- 6.18 Benign Tumors, 121
- 6.19 Malignant Tumors, 122
- 6.20 Female Circumcision, 123

SECTION 7 VAGINA

- 7.1 Vagina, 126
- 7.2 Pelvic Diaphragm From Below, 127
- 7.3 Pelvic Diaphragm From Above, 128
- 7.4 Support of Pelvic Viscera, 129
- 7.5 Female Urethra, 130
- 7.6 Vulva and Vagina Histology, 131
- 7.7 Vagina: Cytology, 132
- 7.8 Congenital Anomalies, 133
- 7.9 Imperforate Hymen, Hematocolpos, Fibrous Hymen, 134
- 7.10 Vaginitis: *Trichomonas*, *Monilia*, Bacterial Vaginosis, 135
- 7.11 Vaginitis: Venereal Infections, 136
- 7.12 Vaginitis: Chemical, Traumatic, 137
- 7.13 Toxic Shock Syndrome, 138
- 7.14 Trauma, 139
- 7.15 Cystocele, Urethrocele, 140
- 7.16 Rectocele, Enterocele, 141
- 7.17 Fistulae, 142
- 7.18 Atrophic Conditions, 143
- 7.19 Cysts and Benign Tumors, 144
- 7.20 Endometriosis: Vulva, Vagina, Cervix, 145
- 7.21 Malignant Tumors: Primary, 146
- 7.22 Malignant Tumors: Metastases and Extensions, 147

SECTION 8 UTERUS AND CERVIX

- 8.1 Pelvic Viscera, 150
- 8.2 Pelvic Viscera and Support From Above, 151
- 8.3 Blood Supply of Uterus and Pelvic Organs, 152
- 8.4 Lymphatic Drainage: Pelvis, 153
- 8.5 Lymphatic Drainage: Internal Genitalia, 154
- 8.6 Innervation of Internal Genitalia, 155
- 8.7 Uterus and Adnexa, 156
- 8.8 Uterine Development and Musculature, 157
- 8.9 Endometrial Blood Supply, 158
- 8.10 Endometrial Cycle, 159
- 8.11 Abnormal Uterine Bleeding, 160
- 8.12 Menorrhagia, 161
- 8.13 Dysmenorrhea, 162
- 8.14 Congenital Anomalies, 163
- 8.15 Displacements, 164
- 8.16 Prolapse, 165
- 8.17 Rupture and Perforation, 166
- 8.18 Lacerations, Strictures, and Polyps, 167
- 8.19 Cervicitis: Erosions, External Infections, 168
- 8.20 Cervicitis: Gonorrhea, Chlamydial Infections, 169
- 8.21 Cancer of Cervix: Cytology, 170
- 8.22 Cancer of Cervix: Various Stages and Types, 171
- 8.23 Cancer of Cervix: Extension and Metastases, 172
- 8.24 Endometrial Hyperplasia: Evolution and Classification, 173
- 8.25 Endometrial Hyperplasia: Polyps and Tuberculous, 174
- 8.26 Adenomyosis, 175
- 8.27 Asherman Syndrome, 176
- 8.28 Myoma (Fibroid): Locations, 177
- 8.29 Myoma (Fibroid): Secondary Changes, 178

- 8 30 Myoma (Fibroid): Degeneration, Obstruction, 179
- 31 Sarcoma, 180
- 32 Cancer of Corpus: Various Stages and Types, 181
- 33 Cancer of Corpus: Histology and Extension, 182

SECTION 9 FALLOPIAN TUBES

- 9.1 Fallopian Tubes, 184
- 9.2 Congenital Anomalies: Absence, Rudiments, 185
- 9.3 Congenital Anomalies: Atresia, Defects, 186
- 9.4 Acute Salpingitis: Bacterial Routes, Parametritis, 187
- 9.5 Acute Salpingitis: Pyosalpinx, 188
- 9.6 Hydrosalpinx, 189
- 9.7 Pelvic Peritonitis, Abscess, 190
- 9.8 Chronic Salpingitis, Adhesions, 191
- 9.9 Obstruction Following Chronic Salpingitis, 192
- 9.10 Tubo-ovarian Abscess, 193
- 9.11 Tuberculosis, 194
- 9.12 Salpingitis Isthmica Nodosa, Carcinoma, 195
- 9.13 Paraovarian or Epoöphoron Cyst, 196

SECTION 10 OVARIES

- 10.1 Ovarian Structures and Development, 198
- 10.2 Endocrine Relations During Cycle, 199
- 10.3 Ovarian Cycle, 200
- 10.4 Hormonal Influence During Life, 201
- 10.5 Menopause, 202
- 10.6 Developmental Anomalies, 203
- 10.7 Gonadal Dysgenesis, 204
- 10.8 Physiologic Variations, Nonneoplastic Cysts, 205
- 10.9 Endometriosis: Pelvis, 206
- 10.10 Infections, 207
- 10.11 Serous Cystoma and Cystadenoma, 208
- 10.12 Papillary Serous Cystadenoma, 209
- 10.13 Papilloma, Serous Adenofibroma, and Cystadenofibroma, 210
- 10.14 Mucinous Cystadenoma, 211
- 10.15 Teratoma, 212
- 10.16 Adnexal Torsion, 213
- 10.17 Feminizing Neoplasms, 214
- 10.18 Masculinizing Neoplasms, 215
- 10.19 Endocrinopathies: Luteinization, 216
- 10.20 Endocrinopathies: Polycystic Ovary Syndrome, 217
- 10.21 Dysgerminoma, Brenner Tumor, 218
- 10.22 Stromatogenous Neoplasms, 219
- 10.23 Primary Cystic Carcinoma, 220
- 10.24 Primary Solid Carcinoma, 221
- 10.25 Secondary Ovarian Carcinoma, 222
- 10.26 Diagnosis of Ovarian Neoplasms, 223
- 10.27 Conditions Simulating Ovarian Neoplasms, 224
- 10.28 Conditions Simulating Ovarian Neoplasms (Continued), 225

SECTION 11 OVUM AND REPRODUCTION

- 11.1 Oocyte and Ovulation, 228
- 11.2 Fertilization, 229
- 11.3 Genetics of Reproduction, 230
- 11.4 Infertility: Causes, 231
- 11.5 Infertility: Evaluation of Female, 232
- 11.6 Infertility: Evaluation of Male, 233
- 11.7 Recurrent Abortion, 234
- 11.8 Assisted Reproduction: IUI, IVF, IVF-ICSI, 235
- 11.9 Assisted Reproduction: Advanced Sperm Selection Techniques, 236
- 11.10 Contraception, 237

SECTION 12 PREGNANCY

- 12.1 Implantation and Early Development of Ovum, 240
- 12.2 Developmental Events of the First Trimester, 241
- 12.3 Developmental Events of the Second Trimester, 242
- 12.4 Developmental Events of the Third Trimester, 243
- 12.5 Development of Placenta and Fetal Membranes, 244
- 12.6 Circulation in the Placenta, 245
- 12.7 Hormonal Fluctuations in Pregnancy, 246
- 12.8 Ectopic Pregnancy: Tubal Pregnancy, 247
- 12.9 Ectopic Pregnancy: Rupture, Abortion, 248
- 12.10 Ectopic Pregnancy: Interstitial, Abdominal, Ovarian, 249
- 12.11 Abortion, 250
- 12.12 Cervical Insufficiency, 251
- 12.13 Multiple Gestation, 252
- 12.14 Placenta: Form and Structure, 253
- 12.15 Placenta: Numbers, Cord, Membranes, 254
- 12.16 Placenta Previa, 255
- 12.17 Abruptio Placentae, 256
- 12.18 Placenta Accreta, 257
- 12.19 Couvelaire Uterus, Amniotic Fluid Embolism, 258
- 12.20 Nodular Lesions of Placenta Other Than True Infarcts, 259
- 12.21 Gestational Trophoblastic Disease, 260
- 12.22 Neuropathways in Parturition, 261
- 12.23 Labor, 262
- 12.24 Fetal Assessment and Intrapartum Monitoring, 263
- 12.25 Normal Birth, 264
- 12.26 Operative Vaginal Delivery, 265
- 12.27 Obstetric Lacerations: Vagina, Perineum, Vulva, 266
- 12.28 Obstetric Lacerations: Fibromuscular Support, 267
- 12.29 Cesarean Delivery, 268
- 12.30 Cesarean Delivery (Continued), 269
- 12.31 Rupture of the Uterus, 270
- 12.32 Uterine Inversion, 271
- 12.33 Urinary Complications of Pregnancy, 272
- 12.34 Preeclampsia: Symptomatology, 273
- 12.35 Preeclampsia: Ophthalmologic Changes in Preeclampsia and Eclampsia, 274
- 12.36 Preeclampsia: Visceral Lesions in Preeclampsia and Eclampsia, 275

- 12.37 Preeclampsia: Placental Infarcts, 276
- 12.38 Causes of Decreased Maternal Circulation, 277
- 12.39 Intrauterine Growth Restriction, 278
- 12.40 Erythroblastosis Fetalis (Rh Sensitization), 279
- 12.41 Syphilis, 280
- 12.42 Puerperal Infection, 281

SECTION 13 BREAST

- 13.1 Position and Structure, 284
- 13.2 Blood Supply, 285
- 13.3 Lymphatic Drainage, 286
- 13.4 Developmental Stages, 287
- 13.5 Functional Changes and Lactation, 288
- 13.6 Polythelia, Polymastia, Hypertrophy, 289
- 13.7 Gynecomastia, 290
- 13.8 Painful Engorgement, Puerperal Mastitis, 291
- 13.9 Nipple Discharge, 292
- 13.10 Galactorrhea, 293
- 13.11 Mondor Disease, 294
- 13.12 Breast Imaging, 295
- 13.13 Fibrocystic Change: Mastodynia, 296
- 13.14 Fibrocystic Change: Adenosis, 297
- 13.15 Fibrocystic Change: Cystic Change, 298
- 13.16 Benign Fibroadenoma, Intracystic Papilloma, 299
- 13.17 Giant Myxoma, Sarcoma, 300
- 13.18 Breast Cancer, 301
- 13.19 Intraductal and Lobular Adenocarcinoma, 302
- 13.20 Inflammatory Carcinoma, 303
- 13.21 Hereditary Breast Disease, 304
- 13.22 Paget Disease of the Nipple, 305
- 13.23 Malignancies of Male Breast, 306

SECTION 14 SEX REASSIGNMENT

- 14.1 Gender Definitions, 308
- 14.2 Surgery: Male Extragenital, 309
- 14.3 Surgery: Male Genital—Vaginectomy, Urethral Lengthening, and Clitoral Reconstruction, 310
- 14.4 Surgery: Male Genital—Metoidioplasty, Phalloplasty, and Neoscrotum Formation, 311
- 14.5 Surgery: Female Extragenital, 312
- 14.6 Surgery: Female Genital—Orchiectomy, Penectomy and Urethrectomy, 313
- 14.7 Surgery: Female Genital—Clitoroplasty, Labiaplasty and Vaginoplasty, 314

Selected References, 315

Index, 317