The eye is a very complex organ and will show a response to an irritation by becoming red. There are a very large number of disorders that can cause the eye to become red. The redness is actually dilation of the conjunctival vessels. The conjunctiva is a blood vessel-containing, clear layer of tissue that overlies the white sclera of the eye. The conjunctiva can become red when it is affected directly as in pink eye or when one of its neighbors is irritated. These neighbors include, the eyelids themselves, the skin of the eyelids, the eyelashes, the border of the eyelid (eyelid margin), the sclera and episclera, the cornea, the iris, the lens, the globe, and the orbit.

This newsletter will list many, but not all, of the wide variety of disorders that can cause a red eye, the anatomy of the affected parts of the eye (Figures A, B, C), and a brief description of several of the disorders. The asterisk graphic is a line drawing of the companion color photo.

Conjunctiva

**Allergic conjunctivitis.** The external eye is under constant immunological challenge from a wide variety of substances, which may lead to the development of one of many conditions that can be loosely grouped together as allergic eye disease.

**Immediate hypersensitivity.** The signs of immediate reactions occur suddenly and include redness, watery discharge and surface reactions in various locations (Fig. D). The causative agents can be animal dander and pollens of grasses and weeds.

**Vernal disease.** This is an antibody-mediated disorder that often includes severe forms of eczema, hay fever and asthma. In addition to redness and watering, immune nodules develop at the limbus (where the white of the sclera meets the clear cornea).

**Contact hypersensitivity.** This arises from the use of cosmetic preparations, contact lens solutions, medication eyedrops, and ointments.

**Papillary conjunctivitis.** This is an immune reaction most commonly occurring with soft lens wearers. Immune nodules called papillae form on the back surface of the upper eyelid.
Toxic reactions

Drug induced reactions. Antivirals, antibiotics, and eyedrop preservatives may interfere with normal surface layer replacement. Both the cornea and conjunctiva may break down.

Chemical burns. These reactions account for the most severe damage to the eye as permanent loss and scarring of the superficial layers occurs immediately upon contact with the toxic agent, especially with ammonia and alkaline chemicals.

Air-borne irritants. Numerous irritants such as chlorine, smog, and smoke may cause immediate or delayed vessel dilation, tearing and discomfort.

Conjunctival foreign body

Dry eye. One of the three normal layers of the tearfilm that protects the front of the eye decreases in amount. This may be idiopathic, age-related, secondary to medications such as diuretics and antihistamines, Sjögren’s syndrome (probably an immune disorder with all mucus membranes becoming dry), and avitaminosis in which a severe nutritional imbalance or deficiency results in vitamin A deficiency.

Conjunctival degenerations. These degenerations are caused by age, and sun and wind exposure and are much more common in dark-skinned people.

Pterygium. A fibroblastic growth that crosses the limbus and grows onto the cornea (Figs. E, E*).

Pingueculum. A raised area of collagen degeneration that may approach the limbus (Figs. F, F*).

Superior limbic keratoconjunctivitis. Of unknown etiology, the tissue breakdown is localized to the superior portion of the cornea and the adjacent conjunctiva (Figs. G, G*).

Infections

Follicular. A watery discharge occurs with cobblestone conjunctival swellings (Figs. H, H*) in adenovirus (pink eye), herpes simplex, herpes zoster, molluscum contagiosum, chlamydia, cat-scratch fever, trachoma, and medications (eserine and pilocarpine).

Viral. Viruses and related organisms are probably responsible for the major proportion of infections of the outer eye. In addition to conjunctival redness, corneal opacities may occur (Figs. I, I*).

Purulent. This has a marked and sudden onset with redness, lid swelling, and secretions of pus in measles, mumps, flu, staphylococcus, streptococcus, pneumococcus, gonorrhea, meningitis, fungi, virus, Reiter’s syndrome, and others.

Membranous. Certain infections and inflammations may cause a membrane to form on the surface of the conjunctiva. This occurs with streptococcus, pneumococcus, chemicals, diphtheria, and viruses.

Ophthalmia neonatorum. An inflammation or infection occurs in the newborn from staph, strep, pneumococcus, haemophilus, gonorrhea, diphtheria, and silver nitrate.
**Cicatricial conjunctivitis.** This is an inflammation that results in permanent surface scarring and redness caused by candida, erythema multiforme (an immune vasculitis is triggered in response to the use of drugs or as a result of certain infections), benign mucous membrane pemphigoid (an autoimmune disorder in which antibodies and other serum agents destroy the conjunctiva), chemicals, injury, and trachoma.

**Conjunctival ulcer.** Acute surface swelling and mechanical rubbing of the conjunctiva occurs in allergy and contact lens wearers. The surface then breaks down and forms an ulcer.

**Subconjunctival hemorrhage.** Fragile conjunctival vessels rupture and bleed beneath the conjunctiva (Figs. J, J*). Normally unpleasant to look at, but benign. Caused by infection, age, fever, coughing, sneezing, lifting, exercise, straining, rubbing, etc.

**Sclera.** Episcleritis is a limited inflammation of the superficial layers between the conjunctiva and the sclera that causes redness, tearing, and pain. It may be diffuse or in nodular form (Figs. K, K*). Scleritis is much more severe with severe pain and greater involvement of the sclera itself. Systemic disorders often associated with scleritis are rheumatoid arthritis, polyarteritis nodosa, gout, tuberculosis, syphilis, and leprosy. It may also occur with insect bites and toxic chemicals as with mitomycin therapy in glaucoma surgery (mitomycin slows the scarring down of the surgical opening).

**Cornea.** Any acute breakdown of the cornea will cause a secondary redness of the conjunctiva. This may occur due to trauma with an abrasion, acute corneal swelling caused by contacts, cataract surgery, acute inflammation of the iris (iritis), and acute glaucoma.

**Chemical injury.** cleaners, insecticides, pool chemicals, gasoline, etc.

**Keratitis.** Inflammation of the superficial layers of the cornea occurs in Herpes Simplex, pink eye, bacterial infections, and dry eyes.

**Interstitial keratitis.** There is inflammation of the deeper layers of the cornea caused by syphilis, Herpes Simplex and Herpes Zoster.

**Corneal ulcer.** A localized corneal excavation (Figs. L, L*) may occur with viral and bacterial infections, chemical breakdown, exposure (inability to close the eye), and allergic swelling.

**Corneal foreign body**

**Photokeratitis.** The corneal epithelium (the seven most superficial layers of the cornea) lose cells and develop opacities due to arc welding and tanning booth burns.

**Pannus.** This is the ingrowth of new blood vessels from the conjunctiva into the cornea in response to hypoxia (soft contacts), infection (trachoma), vernal (allergic swelling), and acne rosacea

**Contacts.** Contacts can cause redness due to direct trauma (abrasion), loss of oxygen (hypoxia), and toxic damage by absorbing harmful chemicals and preservatives.
**Eyelid**

**Ectropion.** The eyelid falls away from the globe (Fig. N) and the exposed area becomes inflamed from lack of moisture.

**Entropion.** Age, injury, and skin cancer may cause the lower eyelid margin to turn in and rub against the globe (Fig. O).

**Exposure.** The eyelids do not close completely due to paralysis of the eyelid muscles (Bell’s Palsy) or proptosis (protrusion of the globe in thyroid disease).

**Stye.** This is an acute oil gland infection.

**Eyelid skin.** Anything that makes the eyelid skin inflamed may cause the eye, itself, to become red. This occurs in measles, scarlet fever, mumps, acne rosacea, eczema, psoriasis, and allergic dermatitis.

**Eyelashes.** Infections at the base of the lashes will also cause redness of the conjunctiva in blepharitis caused by mites, lice, seborrhea, and staphylococcus.

**Trichiasis.** Scarring of the eyelid margin by infections or inflammations can cause the eyelashes to turn in and rub against the eye.

**Iris**

**Iritis.** Inflammation of the iris with leakage of protein and white blood cells from the iris vessels will cause redness of the limbal vessel (Fig. M) and white-cell clumps to deposit on the back of the cornea (Figs. P, P*). Iritis is caused by non-specific causes (98%), ankylosing spondylitis, viruses, sarcoidosis, parasites, and rheumatoid arthritis.

**Hypopyon.** If the inflammation is severe enough, white blood cells will accumulate and layer in the lower portion of the anterior chamber (Figs. Q, Q*).

**Glaucoma.** Any cause of acute glaucoma with a sudden rise in pressure will cause corneal swelling and redness (Figs. R, R*) of the limbal and conjunctival vessels, especially in acute angle closure.

**Endophthalmitis.** Vision threatening infections of the inner portions of the globe may occur following ocular surgery and septicemia. The eye becomes severely red, very painful, and the cornea is usually cloudy.

**Orbit.** Several conditions of the orbit will cause redness such as tear sac infection, cellulitis, sinus infection, inflammatory pseudotumor (orbital inflammation and swelling with protrusion of the globe).

**Proptosis.** The globe protrudes from the orbit and becomes exposed and red. This may be anatomical due to shallow orbits or from thyroid disease or tumors.

**Systemic.** Numerous systemic disorders may cause redness due to direct ocular inflammation changes with hyperthyroidism, lupus erythematosus, and scleroderma.

There are many more!