

Ophthalmology Case Challenges Mini Series

Session 2: The Eyelids and Third Eyelid

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Eyelids and Third Eyelid

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Eyelid surgery: Principles and equipment

The principle aims of eyelid surgery are:

- a) Restoration of anatomy (a hairless lid margin, conjunctival lining)
- b) Restoration of function (blinking, spreading of tear film)

Primary wound closure with perfect apposition of lid margin defects is paramount when performing eyelid surgery. Lid margin defects should never be left to heal by secondary intention, and the margin should be smooth following surgical intervention, with no notching either vertically or horizontally.

To achieve these goals, important considerations include:

- Patient positioning
- Magnification and light source
- Choice of appropriate surgical procedure
- Suitable instrumentation
- Appropriate surgical technique (understanding the problem and thorough surgical planning prior to surgery)
- Choice of appropriate needle size and shape, suture material and size

Skin preparation

Detergents and alcohol damage corneal epithelium so avoid these when preparing the eyelid margin.

Use diluted aqueous povidone iodine solution (not surgical scrub or alcohol prep).

Dilute the 10% stock solution to 1:20 with water or normal saline (to a final concentration of 0.5% povidone-iodine). For flushing the ocular surface, use 1:50 dilution.

Positioning and illumination

Good positioning makes all the difference, so use a deflatable bean bag ('Buster Vacu Op Support', small and large sizes, + vacuum pump, all from NVS)

Use a good overhead light source or use head loupes with illumination (eg from Veterinary Speciality Products).

Instruments

Eyelid kit, including:

- Scalpel handle and blade (no. 15) or no. 64 beaver blade and handle
- Rat-tooth forceps (e.g. Bishop-Harmon, St Martin's)
- Sharp scissors (Stevens tenotomy scissors, straight, rounded tips. Westcott's for conjunctival surgery)
- Desmarres eyelid clamp or equivalent
- Measuring calipers (eg Castroviejo caliper and rule)
- Jaeger lid plate
- Eyelid speculum (Barraquer or Castroviejo)
- Needle holders (e.g. Derf needle holders, Castroviejo/ Barraquer/ Troutman needle holders)
- Suture material (5/0 or 6/0 nylon or polyglactin on 3/8th curved reverse cutting needle)

Note that only a small number of selected eyelid surgery techniques are described here. Always seek advice if uncertain as to which procedure to perform. For complicated cases (eg entropion in certain breeds such as the Shar pei, or in cases where entropion surgery has previously been unsuccessful) referral to or consultation with an ophthalmology specialist may be advisable.

Hair defects (distichiasis, ectopic cilia, trichiasis)

Distichiasis describes the emergence of hairs from meibomian gland openings on the eyelid margin. It is a common condition (80% of American cocker spaniels have distichiasis) and is not always irritant. If it is, electrolysis (NOT electrocautery!) or cryotherapy is indicated. However, note that if too many meibomian glands are destroyed during these procedures, marginal blepharitis may result.

Ectopic cilia are 'aberrant distichia' that protrude through the palpebral conjunctiva to contact the cornea directly. They are usually single and always irritant. They can be difficult to visualise so always evert the eyelid and inspect the conjunctival surface with a good light source. Removal is by sharp excision.

Trichiasis describes normal eyelid hair that is abnormally contacting the cornea. Usually it is due to entropion or long eyelid hairs falling onto the cornea.

Entropion

Entropion (in-turning of the eyelid) is a common problem in dogs, in which it is usually breed-related due to varying anatomical defects of the skull, eyelids and eyelid tendons.

There are many underlying anatomical causes of entropion depending on the breed (see table below) so always look up the correct approach before or seek advice from a veterinary ophthalmic surgeon.

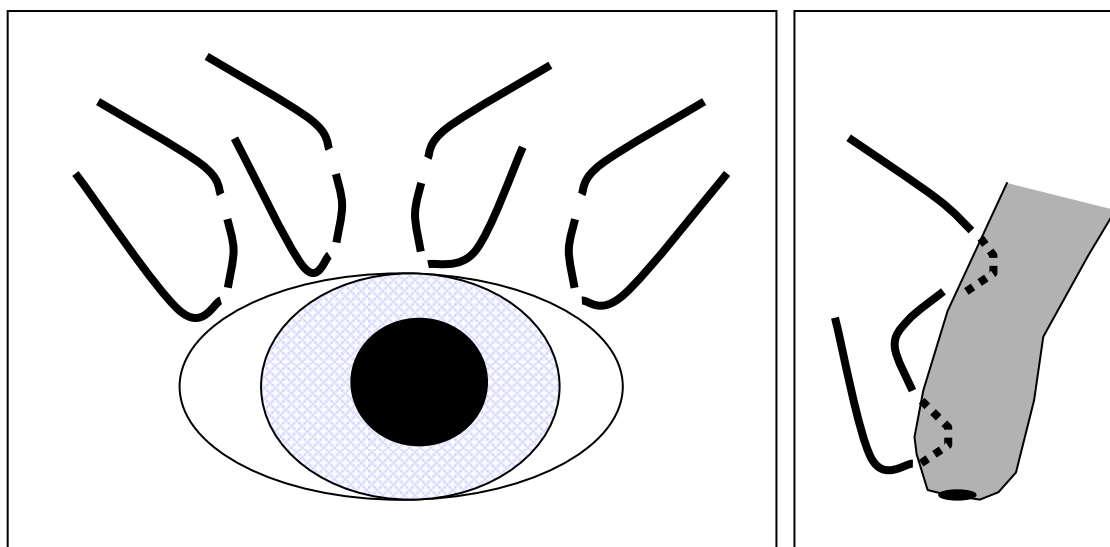
In cats, breed-related entropion is less common but is seen, for example, in the Persian and other brachycephalic breeds. Senile entropion may develop in older cats, and usually affects the lower lateral eyelid. Entropion secondary to other ocular disease (chronic corneal irritation/ulceration, or intraocular pain) is also seen relatively frequently in cats. Application of topical anaesthetic such as proxymetacaine will alleviate any secondary (spastic) entropion. If entropion persists after application of proxymetacaine then the underlying anatomical entropion requires surgical intervention.

Treatment of entropion in young puppies

In puppies, eyelid conformation may change as the puppy ages. This may make definitive surgical correction difficult. Nonetheless, if pain or corneal irritation is present then the entropion must be treated (regardless of what the breeder tells the owner!). In many cases it is possible to place temporary eversion sutures correct the entropion whilst the puppy grows (see diagram below). Definitive entropion surgery can then be performed once the puppy has matured. Sutures need to be replaced every few weeks since they stretch and lose function quickly.

Temporary eversion sutures for entropion in young puppies

- Use 2/0 or 3/0 nylon
- Ensure the sutures are placed partial thickness (skin only), Lembert pattern
- Suture entry point dependent on the degree of entropion
- Suture exit point 2-3mm from eyelid margin, it will be ineffective if placed more distant
- Direct knots away from lid margin. Superglue on knots may reduce slippage
- Repeat the procedure every 3-4 weeks as required

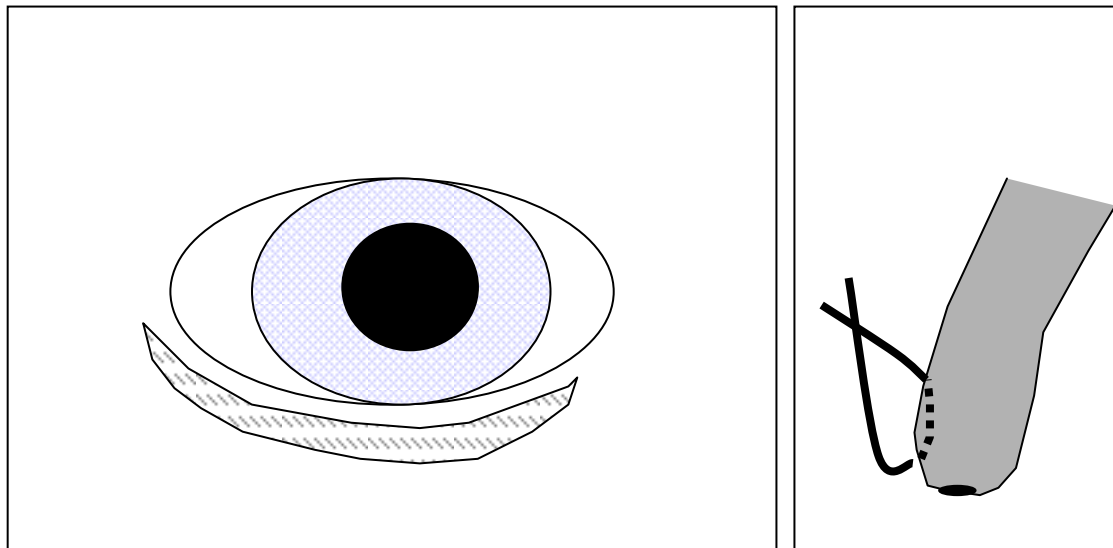


Treatment of entropion in adults

In adults, definitive surgical correction is indicated: The basic treatment is a skin-muscle resection (Hotz-Celsus procedure) in which a sliver of skin and underlying muscle is removed corresponding to the degree of lid in-turning (see below). Note that the incision is not full-thickness (whilst cutting, place your finger in the conjunctival sac to ensure this). The wound is closed using simple interrupted 5/0 or 6/0 nylon or polyglacin sutures.

Hotz-Celsus procedure (skin-muscle resection) for simple entropion

- Assess the degree of entropion after application of topical anaesthetic and prior to G/A.
- The site of the outer incision depends on the degree of entropion
- Make the inner incision approximately 2mm from the eyelid margin (ensuring you leave enough skin to take the suture)
- The length of the resection depends on the length of eyelid affected with entropion
- Perform a partial thickness incision (skin and outer muscle layer only)
- Suture with 5/0 or 6/0 nylon or polyglactin, simple interrupted pattern
- Direct knots away from lid margin



Other entropion procedures

In many breeds, however, the anatomical cause of the entropion is complex and additional approaches may be required (see table). Plan your approach before operating or seek specialist advice.

Some breed-related causes of entropion

Breed	Anatomical defect	Surgical correction
Labrador, Rottweiler	Taut lateral canthal ligament plus overlong lower eyelid causing lateral entropion	Lateral canthal tendonotomy + wedge resection of lid
Shar-pei, Chow	Overlong eyelid plus excess facial folds around eyes causing lower ± upper lid entropion	Wedge resection of lid ± Hotz-Celsus resection or Stades procedure ± facial fold resection (stellate rhytidectomy)
Cocker spaniel	Excess facial folds dorsal to eyes causing upper lid entropion	Facial fold resection ± Stades procedure
Bulldog	Excess nasal folds causing lower lid medial entropion	Nasal fold resection
Bloodhound, Basset, Newfoundland	Overlong eyelids plus weak lateral canthal ligament causing "Diamond eye"	Wedge resection of upper and lower lids plus strengthening of lateral canthus, or facelift procedure (eg nuchal crest anchoring)
Pug, Pekingese and other brachcephalics	Prominent globes causing medial lower eyelid entropion and trichiasis plus pigmentary keratitis	Medial lower eyelid blepharoplasty (medial canthoplasty)

For details of the surgical approaches outlined in the table, see Hamilton *et al.* (1999, 2000), Moore and Constaninescu (1997), Stades and van der Woerd (2013).

Eyelid masses

- Non-neoplastic masses in dogs include dermoid, external hordeolum (impacted eyelid skin gland), internal hordeolum (impacted meibomian gland), chalazion (granuloma following rupture of meibomian gland), meibomian cyst, histiocytosis, nodular fasciitis and (in imported animals) nodular leishmaniasis.

Erosive eyelid diseases include pemphigus, systemic lupus, uveodermatological syndrome (dogs), medial canthal erosion (dogs), and eosinophilic blepharitis (cats).

- A common non-neoplastic condition of the eyelids in cats is lipogranulomatous conjunctivitis. This occurs in middle-aged to older cats, and is a cause of chronic blepharitis and conjunctivitis. The condition is usually bilateral and manifests as multiple white nodules within the palpebral conjunctiva, usually of the upper eyelid. It is non-infectious in aetiology and thought to be due to impaction and rupture of meibomian glands, triggering an inflammatory reaction. Treatment involves resection or curettage of the areas of swelling
- Neoplastic masses in dogs are usually benign. They include meibomian gland adenoma (accounting for >60% of all canine eyelid tumours), benign melanoma (17%) and squamous papilloma (11%). Other tumour types are uncommon and account for <10% of all eyelid neoplasms. They include malignant melanoma, sebaceous adenocarcinoma, histiocytoma, mast cell tumour, lymphoma and basal cell tumour. Malignant eyelid masses in dogs are usually locally invasive rather than metastatic (with the exception of malignant melanoma and lymphoma)
- Neoplastic masses in cats are more likely to be malignant. Squamous cell carcinoma is the most frequently reported type, accounting for up to 65% of cases. It is locally invasive and detailed ocular and periocular work-up is indicated prior to attempted surgical removal. In advanced cases when local invasion is significant, exenteration or orbitectomy may be indicated. Additional treatment options include brachytherapy (gold¹⁹⁸) or photodynamic therapy. Predisposing factors include exposure to UV light and lack of cutaneous pigmentation. Benign masses include basal cell carcinoma, mast cell tumour, papilloma and apocrine hidrocystoma

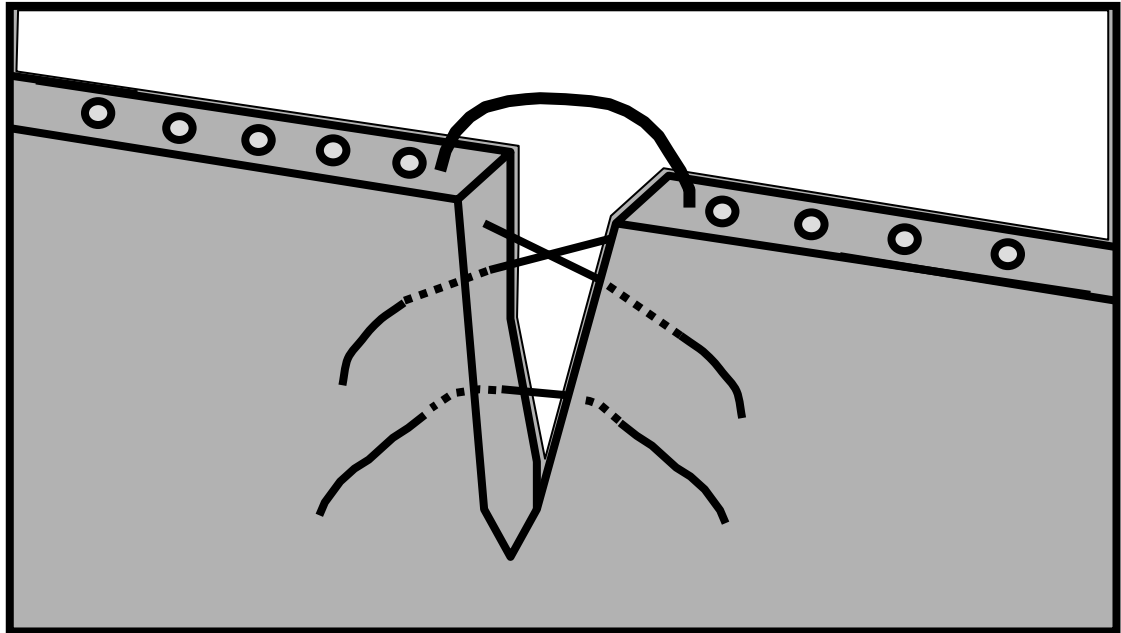
Removal of eyelid masses

Eyelid skin is one of the thinnest in the body and therefore requires gentle handling, fine instruments and a gentle technique. When performing a full-thickness wedge resection of the eyelid margin, be careful about how much eyelid margin you remove, afterwards you will have to close it to allow primary wound healing (any notches will predispose to corneal ulcers). Most books state you can safely remove around ¼ of the eyelid length and still achieve primary closure. This is true for dogs but not for cats or horses where the eyelids are much more tightly apposed. If you need to remove more (e.g. some eyelid tumours) then plan a blepharoplastic repair technique (consider seeking specialist advice).

Direct primary closure of eyelid defect following mass removal (or for treating overlong eyelids)

- Perform a full-thickness excision of the mass (V- or 4-sided excision) with appropriate margin
- Place first suture at eyelid margin (figure-of-eight, partial thickness as shown) knot away from cornea. 5/0 or 6/0 polyglactin

- 1 or 2 layer closure
 - Continuous pattern for conjunctiva, buried suture)
 - Simple interrupted pattern for skin (figure of eight at eyelid margin), direct knots away from lid margin



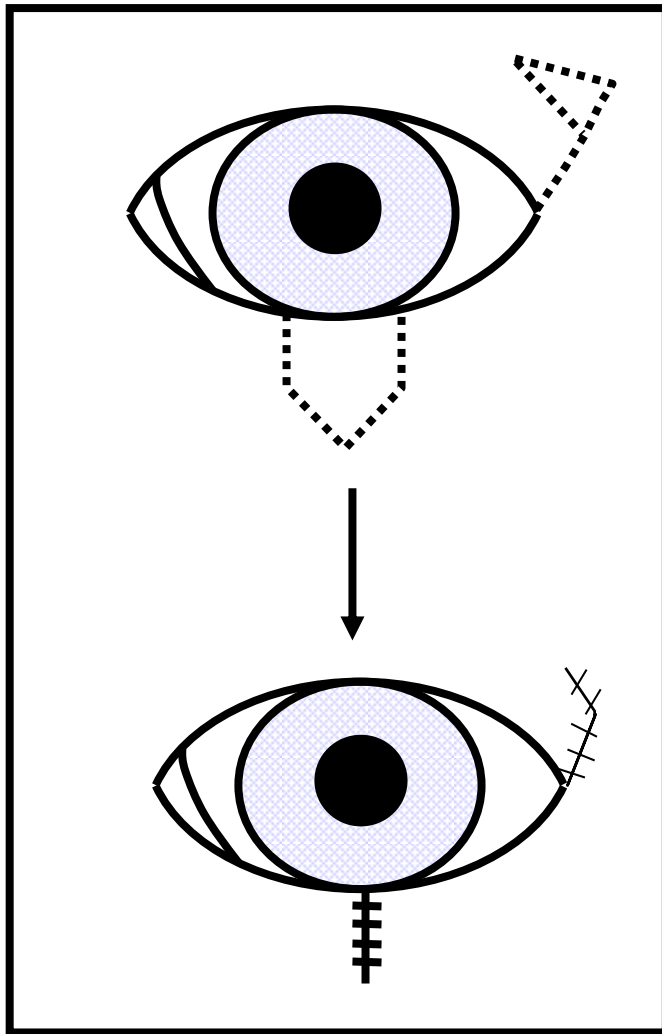
Blepharoplasty techniques

If primary closure of an eyelid margin defect is not possible by direct suturing you will need to perform blepharoplasty following removal of the eyelid margin. Two relatively simple techniques are excision followed by lateral canthal tension relief (sliding canthoplasty), and pedicle advancement flap. For large eyelid margin excisions (>30% of eyelid margin) there are a variety of further surgical options (e.g. rhomboid flap, rotational flap, Z-plasty, lip-to-lid, Mustardé flap). Some of these are complex and it may be worth considering referral to an ophthalmic specialist, or seek advice prior to surgery.

Sliding canthoplasty

This creates additional eyelid length at the lateral canthus, but sliding adjacent haired skin to create new lateral eyelid length. Although this may lead to trichiasis this will be at lateral canthus rather than mid eyelid, hence hairs are less likely to irritate the cornea. It is also possible to undermine adjacent conjunctiva to cover the haired area.

- Perform a full-thickness excision of the mass (V- or 4-sided excision) with appropriate margin
- Perform a lateral canthotomy and extend as shown. Perform a sliding canthoplasty of the lower eyelid (careful subcutaneous blunt dissection of adjacent skin may be required to allow this)
- Excise any excess skin (Burrow's triangles) to avoid tenting
- Suture with 5/0 or 6/0 nylon or polyglactin, 1 or 2 layer closure

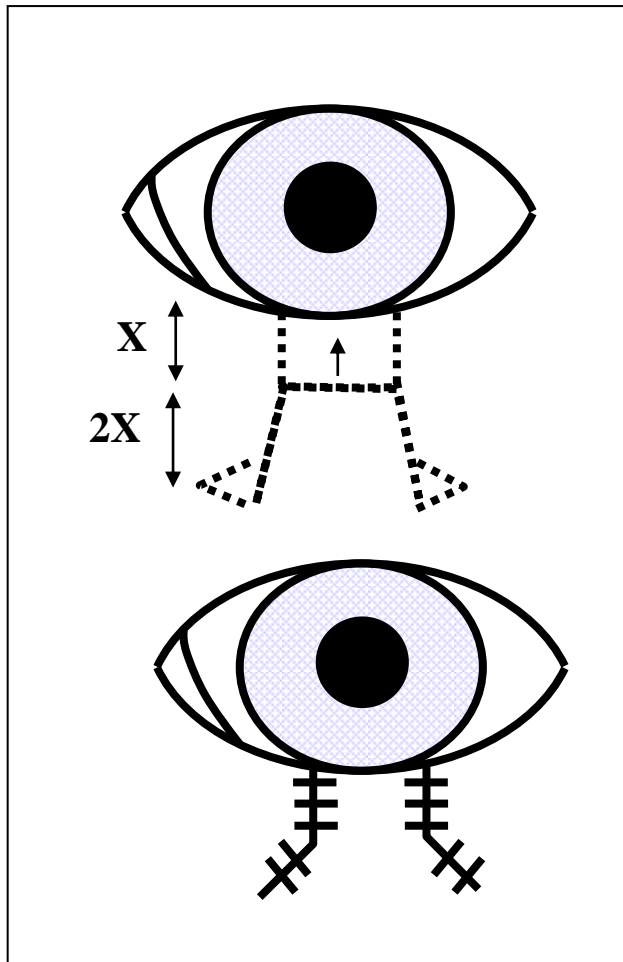


Advancement flap

A full-thickness advancement flap can be used to restore the eyelid margin following removal of a large mass. To prevent trichiasis and corneal irritation, conjunctiva can be mobilised from the fornix and sutured in place to line the defect and eyelid margin.

A partial-thickness advancement flap is probably ideal for eyelid masses that do not involve the underlying conjunctiva or the eyelid margin.

- Perform a full- or partial-thickness 4-sided excision of the mass with appropriate margin
- For a full-thickness defect involving the lid margin, advance adjacent conjunctiva into the defect and suture with 6/0 polyglactin (continuous pattern with buried suture), then proceed as for a partial-thickness defect
- For a partial-thickness defect, create an adjacent partial thickness advancement flap, vertical incisions 20%-50% longer than defect, and advance into defect
- Suture with 5/0 or 6/0 nylon or polyglactin, 1 or 2 layer closure



The third eyelid

Third eyelid gland prolapse (Nictitans gland prolapse, cherry eye)

Third eyelid gland prolapse (TEG prolapse) is common in many breeds but there is a predisposition in the Great Dane, Bulldog, Beagle and Boston terrier. Removal is contraindicated because it predisposes to keratoconjunctivitis sicca. The Morgan pocketing technique is the approach of choice (see textbooks e.g. BSAVA Manual of Ophthalmology).

Scrolling of the cartilage of the third eyelid

This is common in giant breeds (e.g. Mastiff, Great Dane, St. Bernard). It is treated by excision of scrolled portion of cartilage via a conjunctival approach from the inner aspect of the third eyelid. There is usually no need to suture the conjunctival defect, but make sure that no cartilage is protruding otherwise corneal damage may ensue.

Third eyelid protrusion

Causes of third eyelid protrusion include:

- Reduced orbital contents (dehydration, wasting, pterygoid muscle atrophy) allows globe to sink into orbit, third eyelid passively protrudes
- Increased orbital contents (space-occupying lesion) pushes retrobulbar base of third eyelid to cause protrusion

- Ocular pain causing globe retraction (via *retractor bulbi* mm)
- Horner's syndrome
- "Haws" syndrome in cats
- Drug induced e.g. phenothiazine tranquillisers

Further reading

BSAVA Manual of Small Animal Ophthalmology 3rd Edition. Eds DJ Gould, G McLellan. Due to be published Summer 2014

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Moore CP, Constantinescu GM. Surgery of the adnexa. Veterinary Clinics of North America: Small Animal Practice 1997; 27 (5): 1011-1066

Stades and van der Woerd. Diseases and surgery of the canine eyelid. In Veterinary Ophthalmology 5th edition 2013. Ed. KN Gelatt. John Wiley & sons: 832-893