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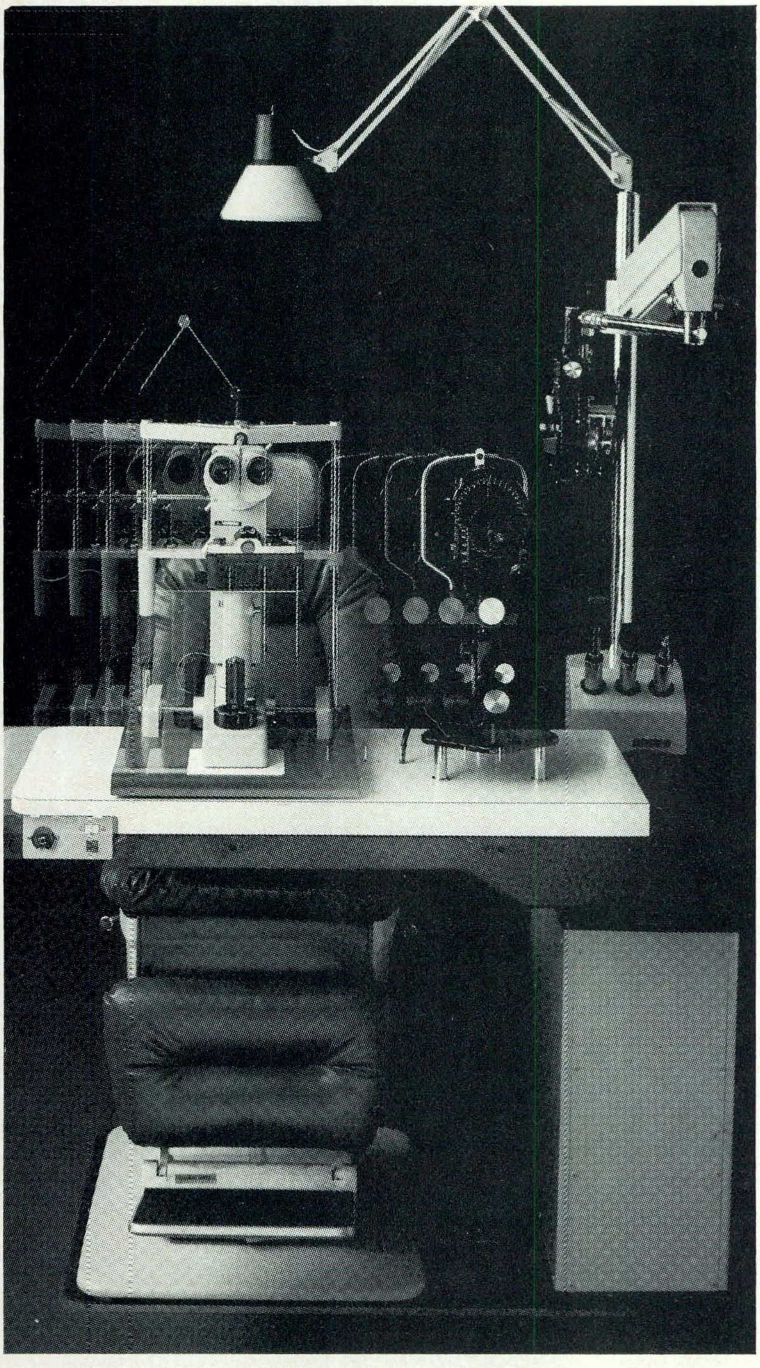

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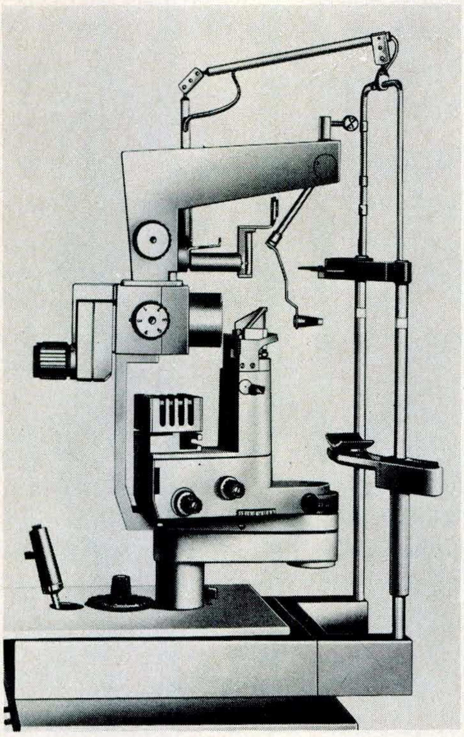

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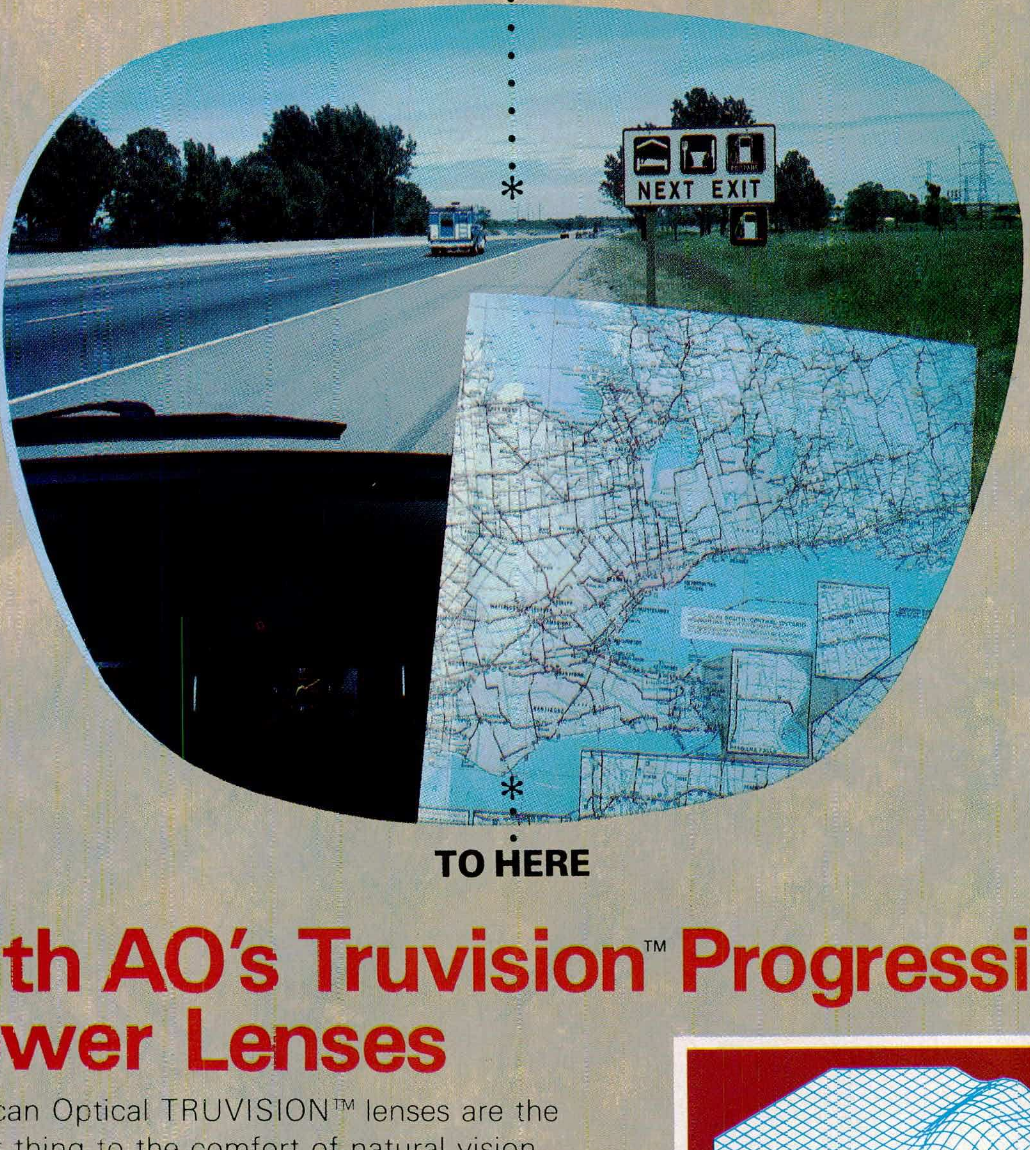

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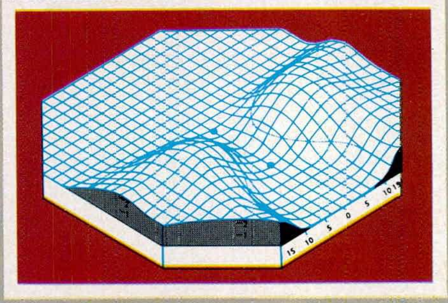

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EDITORIAL

The Price of Freedom is Eternal Vigilance!

One need only to review the circumstances surrounding the efforts by the last Federal government to present and have passed a new Medical Care Act, Bill C-3 (The Canada Health Act), to realise the truth and validity of the above maxim as it applies to Optometry.

Had Bill C-3 passed into law as it was first tabled in the House of Commons, it could have meant the death knell for Optometry as an autonomous health care discipline, not to mention the same fate for other health care disciplines. The Bill, in its initial format, could have led to the entrenchment of a medical monopoly in *all* aspects of health care.

It is often said that history tends to repeat itself. That is particularly true in this instance which is virtually a carbon copy of the situation in 1966 when the Medical Care Act was passed. Optometry, at that time, was presented with a proposed statute — after the fact, as it were. In 1966, changes that recognised optometric services were ultimately enacted as a part of the legislation.

In 1984, Optometry again was able to achieve recognition by presenting its case (again *after* the proposed legislation was first introduced) before the Standing Committee of the House of Commons on health care. The Committee voted unanimously in favour of our key proposal at its meeting on March 21, 1984. As is now public record, Bill C-3 received final reading in its amended form.

Optometrists in Canada owe a debt of gratitude to the members of the CAO President's Committee working on the CAO Brief for its tremendous expense of effort, time and energy.

The authors of the Canada Health Act's original text, advisors to the Minister of Health, are career public servants, a good number of whom are physicians or medically-oriented lay people. It is not surprising, therefore, that the proposed legislation was brought forward without any reference to professionals other than physicians as providers of services under the Act. It illustrates once again the urgency for the appointment of an *Optometric Consultant to the Minister of Health*, to ensure that Optometry's voice is heard during the actual drafting of the text of proposed legislation, thus avoiding the delays, controversies and expenses involved in preparing amendments. In fact, all health care occupations, particularly the five primary disciplines, should have a say in the preparation of such legislation.

Through a separate recommendation in CAO's Brief, the Minister of Health has been apprised of Optometry's policy on this matter of optometric participation in the preparation of new legislation dealing with health matters. Optometry, through its national and provincial Associations, must also give this particular recommendation priority in order to avoid future similar legislative "surprises". Such optometric consultants are required in not only the federal Department of Health and Welfare, but also in provincial Departments of Health and Social/Welfare Services.

Not only must this profession have a word in the preparation of proposed legislation, we must be assured that optometric services are available through the various agencies of both federal and provincial levels of government which provide health services. Optometry must be universally recognised by all departments and agencies whose present contradictory policies, in some cases, must be abolished.

In this same vein, the various levels of government should establish a uniform policy in the distribution of research grants and capital funding for new facilities. The present policy that all such grants must be channelled through the Medical Research Council needs to be changed so that other disciplines can more readily engage in research and development which is *not* copied on the medical model of health care. The makeup of the Council should have a more general representation to eliminate the medical domination. Its name could be changed to, for example, the Council for Research in Health Care, or some similar title, to more fully reflect the true purpose of its raison d'être.

In its fiscal arrangements with the provinces, the federal government should establish a policy that assures a just and equitable distribution of all funds for research and new facilities for the five primary health care disciplines. It is not always true, or even realistic to assume, that medicine is the only health care discipline with the abilities and personnel to conduct valid health research. In fact, what medicine often claims as its own work is actually the effort of such scientists as bio-chemists, chemists, physiologists, bio-engineers and pharmacists among others.

Such a policy would not be in contradiction of the primary aim of the Canada Health Act, namely health care that is universal, comparatively inexpensive and readily accessible. In fact, it would only enhance such objectives by assuring more equitable progress in all fields, avoiding a good deal of the ill will which arises from the seemingly arrogant domination of health care by medicine. It could automatically provide for a minimum level of funding for all groups and, consequently, guarantee that the services offered would be more comprehensive.

These are some of the objectives that Optometry must embark upon. We cannot forget that the price of our present freedom is eternal vigilance and hard work!

GMB

LETTERS

Editor, CJO

In my opinion, there should be more involvement by our profession in meeting the needs of the geriatric population. Optometry should be more responsive to their demands, and I feel that we should be planning to have a larger segment of our patients coming from the elderly age group. There are, I feel, at least four areas with which we should deal:

Education Research: There are functional changes that occur as we age, with a higher incidence of disease. We should be educated and aware of the oculo-visual and systemic problems that can exist. Increased research into age-related visual changes should be pursued.

Diagnostic Drugs: For better disease detection, especially through small pupils and cloudy lenses, it is imperative that Optometry obtain the full use of diagnostic pharmaceutical agents as a help to not only the elderly, but to all optometric patients. I feel that, when set against the benefit of improved pathology detection, the risk is very low.

Low Vision: In Canada, most low vision patients still receive ophthalmological care only. We must expand the optometric role in low vision. Our profession has the unique skills that allow us to derive the maximum benefit from a patient's existing sight.

Accessibility: Optometrists should be planning their offices so they are accessible to the aged and/or non-ambulatory patient. When we renovate, or move, we should have their needs in mind. We should also not rule out institutional visits as a service to provide needed optometric care.

I believe that, if Optometry doesn't change to meet the demands of the elderly, especially if we don't acquire the full range of diagnostic drugs, then this ever-expanding segment of the population will seek medical eye care, to the detriment of Optometry as the primary vision care profession.

Dr. E. Pidutti
Optometrist, Chelmsford, Ontario

PROFILES IN HISTORY

OAO Tribute to Dr. Irving Baker — the H. James Cobean Memorial Award

J. Mittelman*

Editor's Note: *At its 1984 Annual General Meeting, the Ontario Association of Optometrists chose to honour Dr. Irving Baker, Registrar of the College of Optometrists of Ontario. Dr. Baker is well-known to practitioners across Canada and, for this reason, the CJO is pleased to present the full text of OAO President Dr. Joseph Mittelman's tribute.*

Weeks prior to the OAO Congress ten years ago, President-elect Dr. James Cobean of North Bay was killed in a natural gas explosion. In recognition of the substantial contribution that Jim had already made, even so early in his career, and also in recognition of the high esteem in which he was held by his peers, an award was established in his name.

The Dr. H. James Cobean Memorial Award is now the highest honour which this Association may bestow upon a member of the profession in Ontario. It is given in recognition of a life-time contribution of self and service to the advancement of the profession and the science of Optometry. The list of those few who have previously received the award is sufficient testimony in itself of its significance. Previous recipients are: Dr. E.J. Fisher, Dr. Maurice Belanger, Dr. Walwyn S. Long and Dr. Emerson Woodruff.

When the history of optometry in Ontario is finally written, it will be seen that the events taking place in the fifties, sixties and seventies of this century were of great importance to the development of optometry to its present status as a mature, self-governing, primary health-care profession. To appreciate just how much was accomplished in those years, it is useful to bear in mind that in 1950, there was no College of Optometrists of Ontario; there was no Ontario Health Insurance Program (although there were an increasing number of insurance companies selling health insurance which, unfortunately for optometrists, did not cover optometric services); there was no university School of Optometry; no Doctor of Optometry degree, in fact, no degree at all; there was no Health Disciplines Act. At that time, the status of optometry in the province's Departments of Health and Education was practically zero. At that time, our profession was, to say the most, loosely organized. Optometry had not yet put its story together and as a result, those outside optometry, particularly those in government had little dependable knowledge about us. It was a frustrating time for the Board of Examiners, for the College of Optometry and for the Ontario Association of Optometrists.

On the positive side, there was, at that time, a large influx of new graduates into the ranks. Enrollment at the College of Optometry had increased dramatically with the federal Government's education grants to war veterans. Another advantage was that members of the Association, the Board of Examiners and the College of Optometry all recognized that they were fighting the same battle for recognition and for better opportunities to fulfill what they perceived to be a proper role in the province's health care program. The cooperation among these groups was excellent. In fact, in those early rebuilding years, it was sometimes difficult to tell from those present at a meeting and from what was being discussed whether it was a school meeting, a board meeting or an association meeting. In any case, it was work, it was fun and many people gave willingly of their time and effort.

The man we are honouring this afternoon was one of those veterans, who had practiced optometry in the Canadian Army for several years and who, upon discharge, threw himself into the forefront of the reforming process.

By nature, Irving Baker is an intelligent, unflappable and hard-working person. He believes optimistically that, if you have the facts straight and work diligently, in the end things will turn out all right. And when they don't, well, he knows too how hellishly disappointing that can be. Dr. Baker is a very patient man. You can call him any time at home or at his office, provided you are prepared to talk optometry. At meetings, he always hears you out if you have something to say, for he has learned from many years of experience that good ideas often come about through the eclectic process.

When Irv was a student in the early 1940's, one of his professors informs me that he was a very conscientious student with an inquiring mind. Between second and third years during the summer, Irving was busy examining army recruits in the

*President, Ontario Association of Optometrists

morning and off to class in the afternoon. Upon discharge from the army, he entered optometry and proceeded to participate in our reformation. He was a practitioner, educator and politician. Through the years, Irving Baker has never given less than his best to the advancement of optometry, often at great personal sacrifice. He was the first to study in optometry the basic principles of professionalism and professional organization. Many of those basics are so well-established in optometry today because of him. When he was President of O.A.O., he appealed continually to the membership to change their manner of billing patients from the single mark-up system to one of listing material costs and professional fees, a principle solidly entrenched in our legislation today.

The activities of the 1960's were crucial to Optometry in Ontario and Irving Baker played significant roles in our professional development: our response and submission to the Royal Commission on Health (our first real study of our position in the health-care society), the Committee of the Healing Arts, and the intense political negotiations to transfer the College to the University of Waterloo.

Without his knowledge of the law, his sense of fairness in negotiating, his vigilance and care in dealing with the Ministry of Health, our progressive improvements in provincial legislation may not have come as quickly as they did. In this respect, perhaps Irving's crowning achievement came with the successful inclusion of Optometry in the passing of the Ontario Health Disciplines Act, 1974.

When we look back on those days, we can better recognize how important was the role played by Irving. He was O.A.O. President, a member of the Board of Examiners, clinic director and teacher. Although many were involved in the development of the profession, each with an area of expertise, it was Irving Baker who put it all together. He was the contact man and our chief negotiator, the man who led our professional delegations with government. Over time, Irving Baker has become well known and respected with the Ministry of Health and today, he is the senior Registrar among the health-care professions in Ontario.

I have gotten to know Irving Baker a little better over the past few years. I, and others, know he has strongly-held views and positions developed from intense and logical thought, eager to test on anyone who will listen. He has tremendous insight into human behaviour and this has proven to be of great benefit in helping people with problems, decisions and responsibilities. He is a most compassionate man.

Although I have only seen Irving in his professional career, I am told that he is both a dedicated and loving husband and father. They say that behind a successful man is an equally important wife. Helen Baker has stood by her man and has been a most important asset to Irving.

Irving Baker has endured, over the many years, considerable criticism, some earned and some unearned. Our recognition of Irving Baker is long overdue. Today we honour this man, Irving Baker, with the Cobean Award.

Postscript:

I wish to acknowledge the valuable contributions of information from Drs. Belanger, Bobier, Fisher and Hawkins in the presentation of this award.

Dr. J. Mittelman

Following is the text of a tribute paid by Dr. Irving Baker, Registrar of the College of Optometrists of Ontario, speaking on behalf of all Ontario optometrists, to Win Atkinson, the College's long-time Administrative Assistant. The presentation was made at the 1984 Annual General Meeting of the Ontario Association of Optometrists.

I am honoured to introduce at this time to receive an honourary membership in the Ontario Association of Optometrists a person who, in her own right, is unique; a person who least likely suspects that her devotion and contribution to optometry is about to be acknowledged in this way.

Let me describe this person to you. This is a person everyone knows but few have had the good fortune to work with directly. This is a person whose presence has been felt by many. I am talking about a person who is quiet but determined, efficient but never cold, influential but never aggressive, and a person who is *so* dependable that there is in her mind seldom a thought that a task will not be completed.

This is a person who has been an integral part of Ontario optometry for almost two decades. She has influenced students and now looks after the welfare of some of our leaders.

This person happened upon the optometry scene some nineteen years ago in order to earn enough money to buy a bus ticket to go back to Muskoka. Well, either she learned to like us, or we her, or maybe the College never did pay her enough that she could buy that ticket.

Whatever the reason, we in optometry have all benefitted by her presence, her loyalty and her humanity. She has set a standard of excellence and devotion which is likely never to be equalled, let alone surpassed.

It is with deep personal affection and with a most sincere "thank you" from me to her that I present to this gathering the Administrative Assistant of the College of Optometrists of Ontario, Win Atkinson.

I now call on Dr. Mittelman, President of the Ontario Association of Optometrists, to present Win with her Honourary Membership in the Association.

CLINICAL RESEARCH

Electrical Indices of Rod Dysfunction

J.V. Lovasik*
T.D. Williams**

Abstract

Patients presenting with night time vision difficulties and a family history of retinitis pigmentosa require special testing procedures even in the absence of typical functional deficits or ophthalmoscopically visible retinal disease. The authors discuss various theoretical aspects of electroretinography and their practical clinical applications in objectively identifying the physiological defect occurring in retinitis pigmentosa.

Abrégé

Les personnes souffrants de certaines difficultés de la vision nocturne et ayant une histoire familiale de "RP" exigent l'application de tests spécifiques même dans l'absence de déficience sensorielle ou des signes concrets de lésions rétiniennes. Ce travail traite de certains aspects théoriques de la "electroretinography" et de leur application clinique dans un dépistage objectif de ce défaut physiologique dans un cas de RP.

Introduction

Differential diagnoses for patients having difficulty with night time vision include simple night myopia, refractive aberrations resulting from positive spherical aberrations, vitamin A deficiency, and various disorders of retinal function associated with defective rod photoreceptors. Among the retinal disorders resulting in defective night time vision are congenital stationary night blindness, Oguchi's disease, retinitis punctata albescens, and retinitis pigmentosa. One of the most commonly encountered causes of night vision disorders is retinitis pigmentosa (RP)[2]. A definitive diagnosis of RP relies on funduscopic signs, restrictions of the visual fields, elevated rod and/or cone thresholds in dark adaptometry, and reduced or extinguished electroretinograms (ERGs). Neither the absence of the classical bone spicule pigment deposition in the peripheral fundus nor the maintenance of normal or near normal visual fields exclude a possible diagnosis of RP. In the experience of one of the authors (JVL), RP is detectable electrophysiologically despite the retention of normal visual fields. Thus, in the absence of fundus and visual field changes, an early diagnosis of RP can be made on the basis of the ERGs elicited under controlled testing conditions.

Case History

A 13 year old male Caucasian and his 17 year old brother were referred to the Electrodiagnostic Clinic for evaluation of retinal function because of a family history of RP. The results of an oculovisual assessment and special testing procedures will be presented in detail for the younger patient only. The patients' deceased maternal grandfather and great uncle both had suffered from RP with only light perception remaining at the time of their deaths. An earlier ophthalmological consultation had not yielded any information concerning the possible occurrence of RP in either patient. The main concern at that time for the younger patient was for the optical correction of a relatively large amount of bilateral myopia and astigmatism. Although the younger patient did not complain of any significant difficulties with mobility at night time, his father indicated that he did have difficulties identifying people from a distance at night time. However, both parents attributed this difficulty with nocturnal resolution to inadequate street lighting in their home town. The mother was generally sceptical of the possibility that either son could have RP. As far as the mother could judge, neither patient exhibited any difficulties with colour vision of a blue-yellow nature which is frequently a precursor of manifest retinitis pigmentosa.

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School of Optometry, University of Waterloo

Clinical Findings

Refraction

	Prescription	Visual Acuity (6M)
Right Eye	-10.00/-3.75x020	$6/24^{-2}$ $(20/80^{-2})$
Left Eye	-9.25/-4.00x165	$6/21^{-2}$ $(20/70^{-2})$
Both Eyes		6/21 (20/70)

Visual acuity could not be improved with either single or multiple pinhole apertures.

Near-point visual acuity was difficult to quantify with a standard reading chart. However, with considerable effort, the patient was able to attain a 0.75m acuity level in each eye using +8.00D reading adds and holding the reading material approximately 10cm from the facial plane.

Binocularity

Standard cover test procedures for detecting a phoria or tropia were not useful because of the patient's reduced near-point and distance visual acuity. The Hirschberg corneal light reflex technique indicated a constant left esotropia of approximately 10 prism diopters for a 40cm observation distance.

Visual Fields

Monocular confrontation fields suggested only a slight restriction of the inferior visual field in each eye. A standard tangent screen procedure for central visual fields could not be done because of the patient's reduced visual acuity. When a 5mm white target was used at a 1M distance, the visual fields for each eye were shown to be roughly symmetrical and approximately 20° to 25° in diameter.

Electrodiagnostic Evaluation

Accommodation was relaxed and the pupil of each eye dilated with 1% cyclopentolate hydrochloride while the patient dark adapted for approximately 40 minutes. Each eye was tested separately after dark adaptation. The right side of Fig. 1 illustrates scotopic ERGs elicited for the patient's right eye by scotopically matched blue and red light flashes and a white flash presented within a ganzfeld stimulator[3]. The ERG was extinguished for the blue flash test condition. On the other hand, the red light elicited a measurable ERG but with a "b" wave composed of a single peak as opposed to the expected double peak found in normals. The ERG in response to the white flash was of low amplitude with a longer than normal implicit time for the "b" wave. These abnormalities clearly indicated a gross rod dysfunction. Similar results were obtained for the patient's left eye.

When an abnormality of rod function is indicated by blue, red and white flashes, retinal function is further evaluated by scotopic ERGs in response to red and blue flashes of increasing intensity. Fig. 2 presents a typically normal pattern of ERG responses to blue and red flashes of increasing intensity. Note in particular that testing for graded rod activity by increasing the blue flash intensity causes the amplitude of the "b" wave to increase and the implicit time to decrease systematically. Similarly, increasing the red flash intensity causes the amplitude of the double peak "b" wave to increase and the implicit time of the rod component to decrease. The implicit time of the cone portion of the "b" wave remains unchanged for all stimulus intensities. Fig. 3 illustrates the ERG responses to blue and red flashes of increasing intensity for the patient: None of the normal stimulus-response relationships described above were observable in the patient. The red flashes elicited ERGs whose small "b" wave tended to increase in amplitude with stimulus intensity. However the slower rod portion of the "b" wave was totally absent. Note the development of oscillations of decreasing amplitude in the falling portion of the "b" wave at the higher flash intensities. In sharp contrast, blue flashes of increasing intensity failed to elicit any retinal response at low and moderate intensities and only a small signal for the brightest flash.

One additional test to further confirm the absence of rod activity was performed for this patient. Under dark adapted conditions, presenting blue or red flashes of increasing frequency elicits single and then "flicker" ERGs[4-6] (a series of ERGs resembling a sinewave) whose amplitude decreases with increasing flash frequency (Fig. 4). As the rod photoreceptors are incapable of responding to flash stimuli beyond approximately 25 to 30 Hz., the "b" wave amplitude flash frequency function for a normal individual (stimulated with a flashing red light) is characterized by a "rod-cone break" at approximately 25 to 30 Hz (Fig. 5). The solid upper line in Fig. 5 indicates a rod-cone break typical for an individual with normal retinal function. It should be noted that at a flash frequency of approximately 60 to 80 Hz., the amplitude of the "flicker" ERGs reduces to zero. This represents the electrophysiological counterpart of the psychophysically determined critical fusion frequency (CFF). This biphasic "b" wave amplitude-flash frequency function occurs because the red flash is effective in eliciting a response from both rods and cones. The portion of the curve for flash frequencies between 1Hz. and approximately 25Hz. is largely due to rod activity. Since rods reach their fusion frequency at about 25Hz the second arm of the red flash responsive curve is a function of cone activity exclusively. Note that the patient's "b" wave amplitude-flash frequency function for red flash did not show a rod-cone break. In fact, it tended to saturate at a flash frequency below 60Hz. which under the testing conditions employed is somewhat low. This latter observation implies that the rod dystrophy evident on ERG testing has likely involved the cones as well.

RP is very often associated with an extinguished ERG in the light or dark adapted retina. However, in early cases of autosomal recessive (AR) or autosomal dominant (AD) RP small amplitude ERGs with prolonged "b" wave latencies are recordable. This patient showed reduced amplitude and prolonged latency flicker ERGs for both photopic and scotopic conditions, (Fig. 6) suggesting an AR or AD mode of inheritance. A detailed family tree would be required to determine the exact hereditary mode of transmission.

In summary, the patient showed extinguished ERGs to constant or graded intensity flashes of blue light, and an ERG with a missing peak in response to scotopically matched flashes of constant or graded intensity red light. Also, he did not show the typical rod-cone break in the "b" wave amplitude-flash frequency function. Given these results and family history, one must conclude that this patient is suffering from a widespread rod dysfunction, likely RP. A diagnosis of retinitis albescens punctata can be eliminated on the basis of the fundus appearance. Fig. 7 presents composite fundus pictures for the patient's right and left eyes. Note the absence of any of the commonly reported bone spicule pigmentation in the periphery of the fundus, as well as the absence of any well defined white spots characteristic of retinitis punctata. The overall appearance is that of a normal fundus, with relatively scant RPE and choroidal pigmentation. The family history of eventual blindness in the grandfather and great uncle, and the patient's current reduction in visual acuity, despite a full optical correction for myopia and astigmatism, indicate an unfavourable visual prognosis.

Discussion

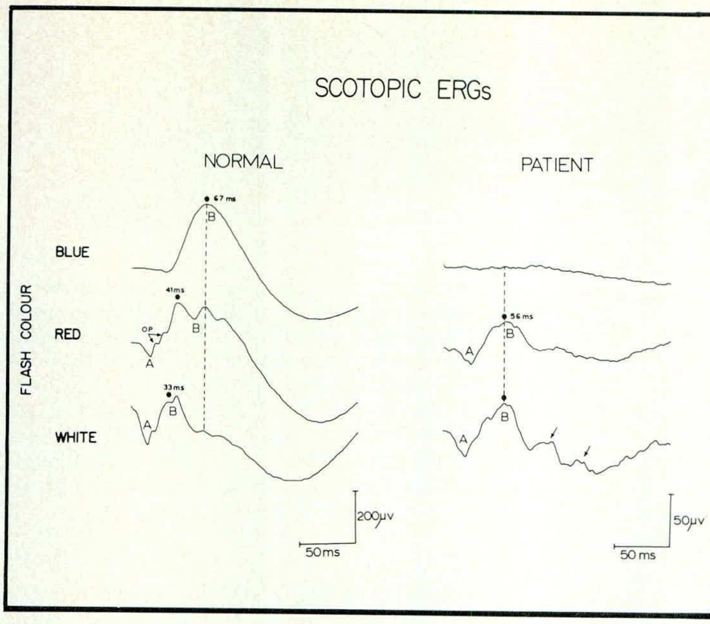
ERG Evaluation of Rod-Cone Function

The human retina is composed of two types of photoreceptors, the cones and rods. The former class of neuron is primarily responsible for acute day time vision while the latter is maximally sensitive for night time vision. Under controlled light conditions, it is possible to isolate cone from rod activity and identify any physiological dysfunction of either class of photoreceptor. The standard testing procedure for assessing rod function at the University of Waterloo Electrodiagnostic Clinic involves the evaluation of ERGs elicited by scotopically matched red and blue light flashes as well as white flashes[1]. The intensities of the red and blue flashes are matched so that for a standard observer with normal retinal function the ERGs will have "b" waves of nearly equal amplitude. In addition, the ERG elicited by a diffuse flash of red light will be characterized by a "b" wave with two peaks. The first major positive peak corresponds to the faster responding cone system, while the second major positive peak identifies the slower reacting rod system[2]. A white flash will elicit a short latency ERG with a "b" wave amplitude greater than that elicited by either the red or blue flash. The implicit time or "peak" time of the "b" wave of ERGs elicited in dark adaptation (Scotopic ERGs) varies with the test flash. Normally, the implicit time of the scotopic ERG elicited by a dim blue flash is longer than the implicit time of the "b" wave for a scotopically matched red flash, which in turn is longer than the implicit time of the "b" wave for a white flash. Averaged Scotopic ERGs elicited from a juvenile with normal retinal function are illustrated on the left side in Fig. 1. Note that the ERG elicited by the blue flash is primarily composed of a positive (upward) going "b" wave while the ERG in response to a red flash is composed both of a small negative going (downward) "a" wave following by a positive going "b" wave. The ERG in response to a single diffuse flash of white light is composed of a large "a" wave followed by a very large "b" wave. However, an averaged white flash ERG such as the one shown in Fig. 1 will have a smaller "b" wave than a single flash ERG because of progressive photoreceptor pigment bleaching on repeated stimulation with intense white flashes.

When an optometrist is confronted with a patient with a family history of RP, but without any of the typical fundus signs, it is incumbent on him or her to obtain an electrodiagnostic evaluation of retinal function before deciding on the presence or absence of any cone or rod dysfunction.

This report is presented to emphasize the value of objective, electrophysiological indicators of abnormalities in rod or cone function before a definitive diagnosis is made. Psychophysical test procedures, such as dark adaptometry, that are used to assess retinal function are occasionally invalidated by poor patient compliance or ability to respond appropriately in the testing procedure. In the present case, visual field testing gave no clear indication of an advanced photoreceptor dysfunction. Nor did the patient present with any of the symptoms typical of the field losses normally reported by patients with advanced retinitis pigmentosa. Perhaps the expected symptoms of difficulty with night time vision and mobility were somewhat confounded by the parents' belief that any nocturnal resolution abnormalities were related to poor street lighting. It is somewhat surprising that the one ophthalmological consultation a few years prior to this referral apparently did not include an electrodiagnostic evaluation of retinal function because of the family history of RP. Perhaps normal retinal function was assumed because of the relatively normal appearance of the ocular fundus. Clearly, however, there may be pronounced physiological disorders, despite a normal looking fundus as in the case reported here.

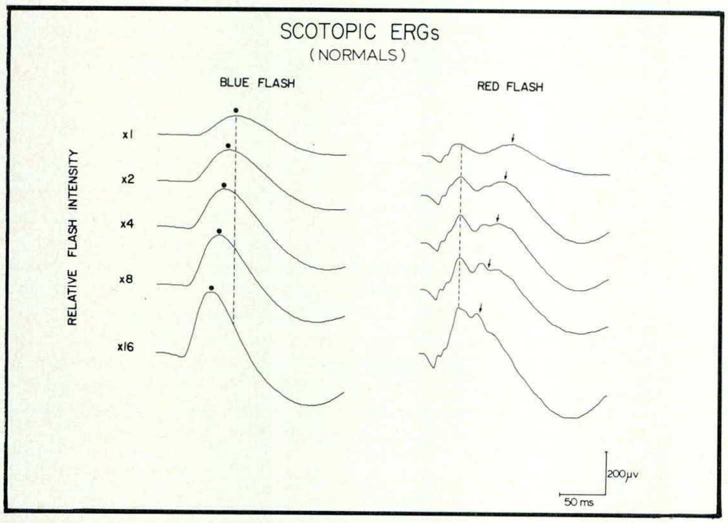
One interesting aspect of this case is that the patient's progressive increase in myopia over the last few years may have been interpreted as the cause of his difficulty with night time vision or generally inferior vision for all visual tasks. Without electrodiagnostic testing, one might assume, incorrectly, that there is residual amblyopia related to uncorrected myopia from an early age. However, ERG testing indicated without any doubt that a severe rod dysfunction was present. Furthermore, the deterioration of retinal function appears to be progressing towards central retinal mechanisms as judged by the reduction in the cone following frequency and delayed photopic flicker ERGs to red



◀Fig. 1

Left side: Scotopic ERGs for a patient with normal retinal function. The blue and red flashes were scotopically matched (equated for intensity to give approximately equal amplitude "b" wave responses). Each record is the average of 20 consecutive ERGs recorded with a Burian-Allen corneal electrode. The vertical dashed line was drawn to emphasize the differences in the implicit time of the "b" waves. Note that the implicit time for the "b" wave is progressively shorter for the blue, red and white flashes. The small black dots specify the place in each ERG where the implicit time of the "b" wave is measured. The amplitude of the "b" wave is measured from the trough of the "a" wave to the peak of the "b" wave. "OP" refers to oscillatory potentials found on the early rising component of the "b" wave.

Right side: Scotopic ERGs for the patient in this case, under the same test conditions. Note the absence of a retinal response to the dim blue flash which is used to elicit exclusively rod responses. The ERG corresponding to the red flash is delayed, has a very low amplitude, and is missing the second major positive peak which is attributed to rod activity. The white flash ERG is also delayed and of low amplitude. The vertical dashed line is drawn at the approximate location where the rod component of the scotopic blue and red flash ERGs should have occurred. The small arrows indicate decaying oscillations of the "b" wave frequently recorded for RP patients.



◀Fig. 2

Figure illustrating the normal response pattern in averaged scotopic ERGs (n=20) elicited by scotopically matched blue and red light flashes of increasing intensity. Note that at low flash intensity the red flashes elicit an ERG whose "b" wave is composed of two peaks. The first peak is due to cone activity while the second slower peak is due to rod activity. The vertical dashed line drawn through the cone portion of the "b" wave emphasizes the fact that the implicit time of this peak does not change with stimulus intensity but does show a progressive increase in amplitude. The rod peak shows a progressive increase in amplitude and decrease in implicit time as the intensity of the flashes increases. The small inverted arrows identify the rod portion of the "b" wave. For blue flash test conditions, the small black dots mark the implicit times of the "b" waves. The vertical dashed line highlights the changes in the implicit times with flash intensity.

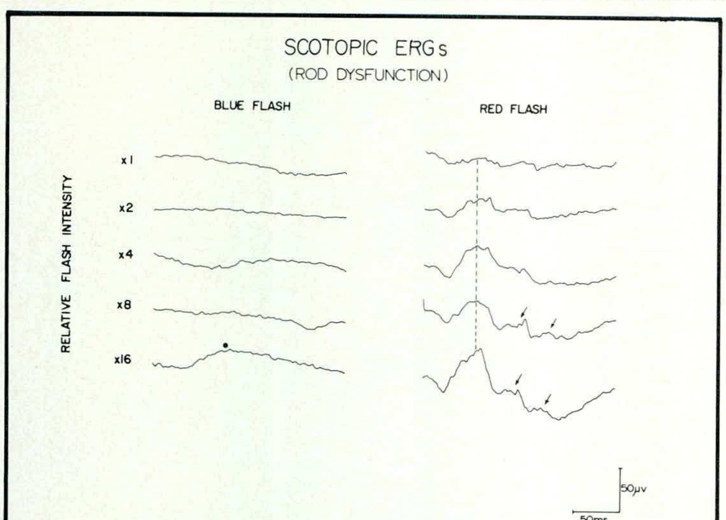


Fig. 3

Averaged scotopic ERGs (n=20) obtained for the patient in this case for the same conditions described for Fig. 2. It is noted that the red light flashes elicited an ERG with a "b" wave composed of a single peak. This peak, attributed to cone function, showed a progressive increase in amplitude with an increase in stimulus intensity. The second peak indicative of rod activity is completely absent. The small inverted arrows locate decreasing amplitude oscillations of the "b" wave at the higher flash intensities. A blue light flash of increasing intensity failed to elicit any significant ERG. A severe rod dysfunction was indicated.

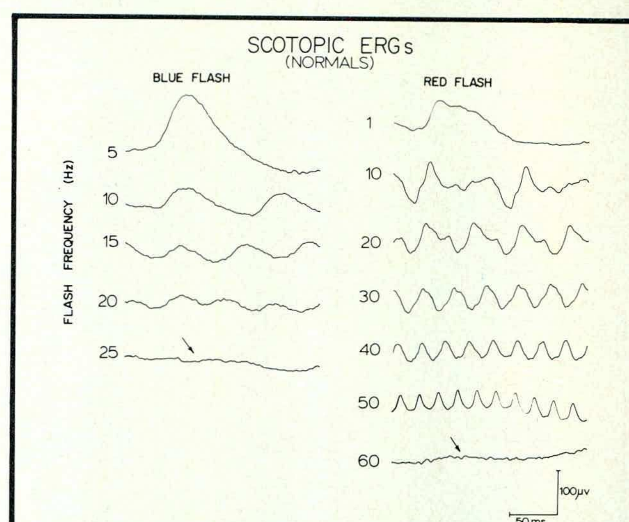


Fig. 4

Figure showing the normal change in the averaged scotopic ERG waveform and amplitude as a function of flash colour and frequency. For blue light (activating only rods) the flicker ERG response reduces to zero at flash frequencies near 25Hz. Red flashes (activating rods and cones) elicit flicker ERGs far above 25Hz, frequently reducing to zero value only at flash frequencies exceeding 60Hz. The fusion frequency for blue and red flashes is indicated by small oblique arrows.

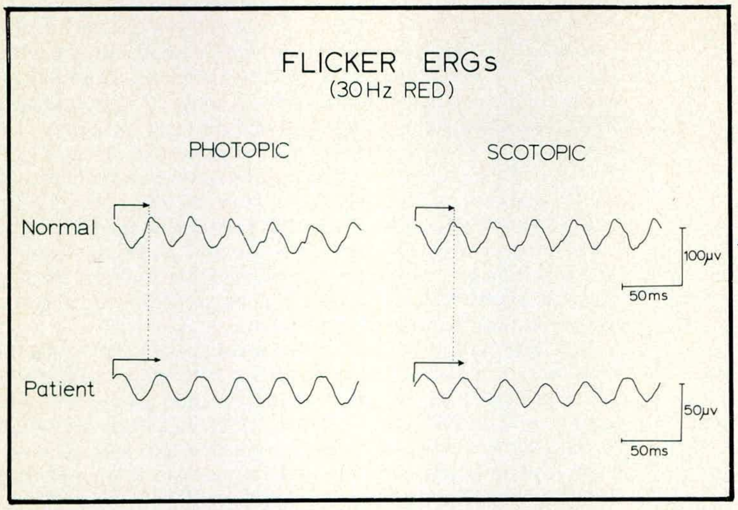


Fig. 5

Graph illustrating the "b" wave amplitude as a function of stimulus frequency for red flashes scotopically matched to blue light flashes for a normal observer (solid lines) and for the patient in this case (broken lines). Note that for red flashes the normal observer demonstrates a biphasic amplitude/frequency function that "breaks" at approximately 30Hz.. The ERG fusion frequency for this normal observer was approximately 80Hz.. In direct contrast, the patient in this case demonstrated a low amplitude ERG response at low flash frequencies, no rod cone break at 25-30Hz., and a reduced flash fusion frequency.

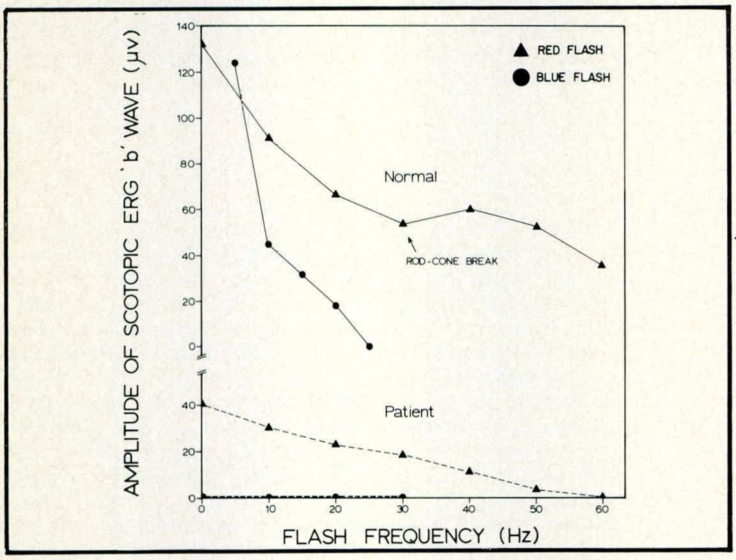


Fig. 6

Comparison of photopic and scotopic flicker ERGs of a normal patient to those obtained from the right eye of the patient in this case. Similar results were found for the patient's left eye. These records are the averaged responses of 20, 200 m.sec. responses to red flashes presented 30Hz. A sinewave response with 6 peaks is expected since only one fifth (200 m.sec.) of the responses to 30 flashes per second are recorded for easy resolution of the flicker ERG waveform. Note the delayed flicker response of the patient shown as a misalignment of the peaks for the flicker ERG of a patient with normal retinal function. The vertical dashed lines highlight the delayed response. Note also that this patient's response amplitude was about half that for the normal.

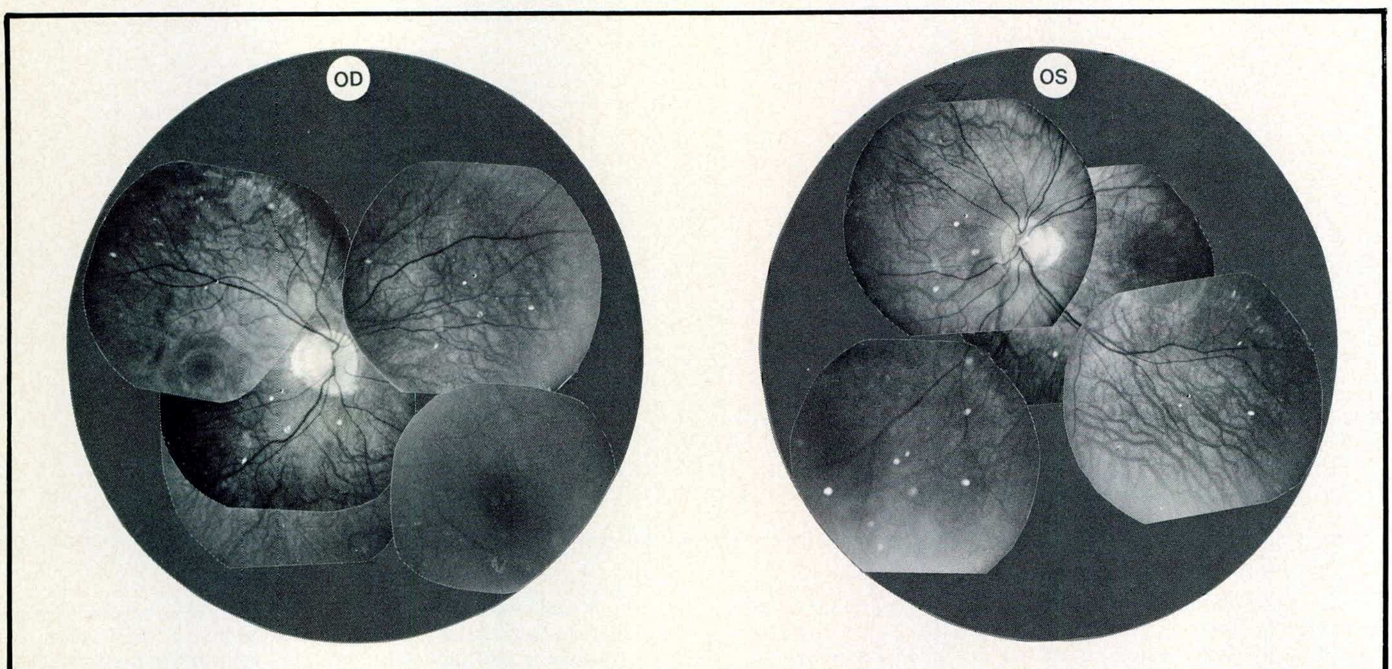


Fig. 7

Composite fundus pictures of the patient's right and left eye. These figures illustrate an absence of any abnormal fundus signs characteristic of RP. The small white spots in these pictures are photographic artifacts. A prominent myopic conus is evident near the optic nerve head of each eye. Except for the slight pallor of the entire fundus and the myopic conus, all fundus signs appear within normal limits. These fundus pictures emphasize that severe physiological dysfunctions may occur in a relatively normal appearing ocular fundus.

flashes. This latter observation provides an adequate explanation for bilaterally reduced central visual acuities.

A further noteworthy point in this case was that the patient's older brother demonstrated virtually identical abnormalities in the ERG to each of the tests applied, yet retained a 6/9 (20/30) visual acuity level in each eye with an optical correction for moderate myopia and astigmatism. This latter refractive finding had been stable for a number of years. Given the very similar electrodiagnostic findings for both brothers, and the significant difference in refractive error, it cannot be argued that the abnormality of the retinal response for the thirteen year old patient was directly attributable to his highly myopic condition. The fundus appearances for the older brother were the same as those shown in Fig. 7.

Another noteworthy point about the older brother was that he failed to detect (with either eye) any of the diagnostic numbers present in the Ishihara colour plates, yet had a nearly perfect score on the Panel D-15 colour test. (Neither test indicated a well defined colour deficiency in the younger patient). More comprehensive colour vision testing by such tests as the FM 100-hue test or the Nagel anomaloscope may have disclosed some colour anomaly. This finding cautions that the results of colour vision testing alone are not diagnostic, and may, at times, be totally invalidated either because of reduced visual acuity or retinal dysfunction of a general nature. Thus, RP should still be a possible diagnosis even in the absence of a blue-yellow colour defect.

In view of the parents' scepticism over a possible diagnosis of retinitis pigmentosa, they were encouraged to attend part of the ERG evaluation. We believe they found the experience informative and convincing with regard to the likely diagnosis. In view of the eventual diagnosis of RP, the parents were advised that an annual examination to re-evaluate retinal function would be worthwhile in order to determine whether the condition is stabilized or progressive. The parents were also informed that should vision continue to deteriorate, there were low vision devices which would likely be helpful for reading purposes. Finally, the parents were counselled not to expect any improvements in their son's vision, and to be highly selective in the guidance given him with respect to future occupational possibilities. A re-evaluation of retinal function has been scheduled in twelve months.

Acknowledgement

This report was funded in part by a Canadian Optometric Education Trust Fund research grant to Dr. J. V. Lovasik.

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CASE REPORT

Ipsilateral Glaucoma in Sturge-Weber Syndrome

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A.P. Cullen**

Abstract

A case of Sturge-Weber syndrome in a young Chinese woman is presented. The classic facial cutaneous angioma extends to involve other parts of her body. Ipsilateral glaucoma previously undiagnosed was detected. Associated field defects include enlargement of the blind spot and a general depression of the field.

Abrégé

L'histoire d'une jeune chinoise souffrante du syndrôme Sturge-Weber fait le sujet de ce rapport. L'angiome facial typique se reproduit ailleurs sur son corps. Un glaucome monoculaire insoupçonné, du même coté que l'angiome a été révélé ainsi qu'une contraction du champ visuel et un aggrandissement de la papille de Mariotte.

A twenty-three year old Chinese female university student presented at the University of Waterloo School of Optometry clinic for a routine eye examination complaining of decreased acuity in her right eye. She reported that the vision of her left eye had been poor since birth. Her previous spherical correction had been provided one year earlier. She claimed and appeared to be in good general health and was taking no medications. A family and personal history, elicited with difficulty, was unremarkable.

Diagnostic Data

The patient's best corrected acuity was 6/6(20/20) in her right eye with -4.25/-0.75 x 165 but her left eye could not be improved to better than CF at 2/3 metre although laser interferometry suggested a potential 6/120 (20/400). A dramatic "port wine" angioma (nevus flammeus) covered most of the left trigeminal region with sparing of the lower maxillary region (Fig. 1). The lesion extended to involve the scalp, ear, retroauricular region, shoulder, upper chest, arm and hand (Fig. 2). She reported additional islands existing elsewhere on her body and the involvement of the left oral mucosa was readily apparent.

Other than a left Marcus Gunn pupil there were no overt neurological signs or symptoms.

The external structures and anterior segment of the right eye were normal; ophthalmoscopy revealed a healthy fundus with a 0.5 physiologically cupped disc vertically and horizontally.

Telangiectatic vessels were noted in the left conjunctiva and although no choroidal hemangiomata were seen the left disc was 0.9 pathologically cupped (Fig. 3). The size of the cornea and globe did not vary from the right eye.

Intraocular pressure was measured at R.18 mmHg L. 45 mmHg. (Goldmann) Gonioscopy (Fig. 4) revealed mesodermal tissue extending over the trabeculum in an otherwise normal open angle.

Goldmann perimetry (Fig. 5) indicated an overall depression of all isopters and a very enlarged blind-spot rather than other classical glaucomatous defects.

Treatment Plan

The patient was diagnosed as Sturge-Weber Syndrome with ipsilateral glaucoma but without overt CNS or visceral signs, and referred for ophthalmological management. The initial diagnosis was confirmed and pilocarpine 2% q.i.d. was prescribed for the left eye. After four weeks this was increased to pilocarpine 4% q.i.d. which reduced IOP to 31 mmHg (Goldmann). Subsequently timolol 0.5% b.i.d. has been added to the treatment regimen resulting in adequate medical control of IOP level. In view of the absence of CNS systemic signs and/or symptoms the eye surgeon felt it inappropriate to subject the patient to comprehensive laboratory and hospital investigation for possible CNS or visceral involvement.

Discussion

The classical dermal sign, a flat (rarely tuberous) cutaneous facial angioma, which involves one or more branches of the Vth cranial nerve initially attracts attention to the victims of this disease, yet it is the hidden associated conditions which are potentially more ominous. These may be ocular, neurological and/or visceral. Ipsilateral glaucoma occurs in between 10% and 30% of patients with Sturge-Weber syndrome; if it develops *in utero* or

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Fig. 1 Nevus flammeus showing involvement of oral mucosa and the neck. There is also a slight facial hemihypertrophy.

Cutaneous hemangioma of the left hand with distribution over the C6 dermatome. Fig. 2

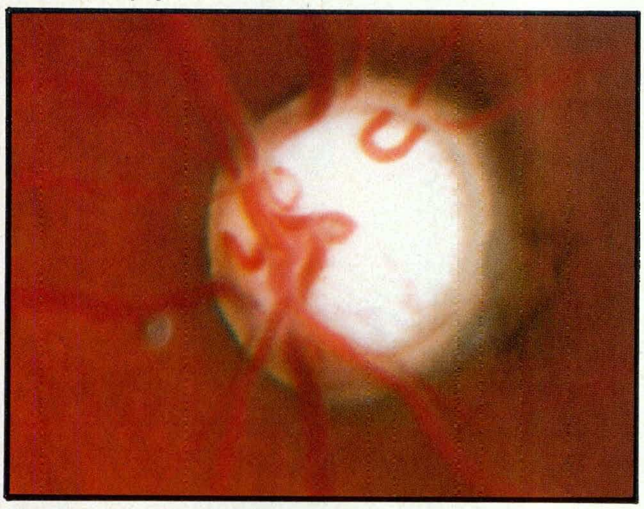
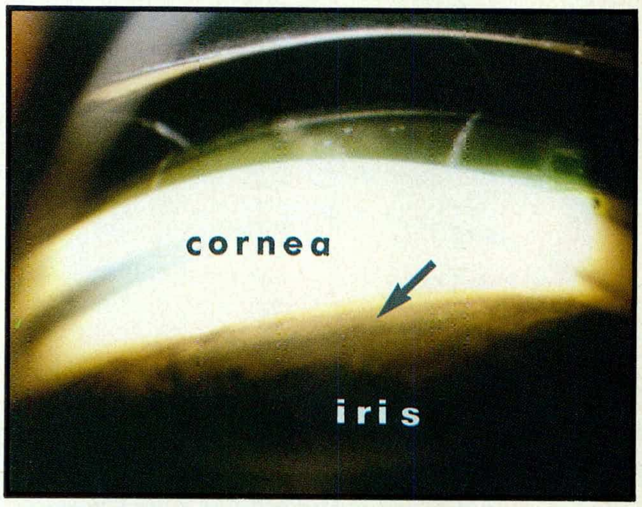


Fig. 3 Left disc showing extensive glaucomatous cupping.



Gonioscopy of the angle of the left eye showing a relatively normal open angle but with mesodermal tissue on the trabeculum (arrow). Fig. 4

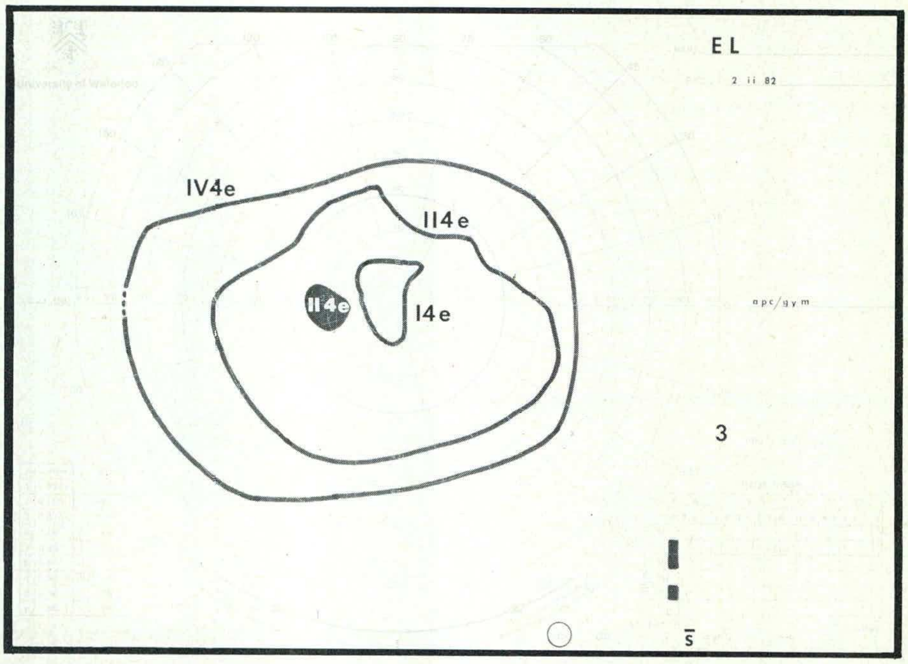


Fig. 5 Goldmann Perimetry of the left eye indicating an enlarged blind spot and general depression of the visual field.

early in life bupthalmos results. Bilateral and contralateral glaucoma occur only rarely[1] and the incidence suggests that some of these cases may not be related to the syndrome. The glaucoma may be due to developmental malformations in the angle similar to other forms of congenital glaucoma or may more frequently be associated with aqueous outflow interference caused by vascular anomalies of the limbal or episcleral regions.[2] Other Sturge-Weber patients have choroidal hemangiomata[3] which may lead to retinal detachment, rubeosis iridis, PAS (peripheral anterior synechiae) and secondary glaucoma. Leptomingeal angiomas and underlying cerebral cortex calcification may lead to local contralateral seizures and hemiparesis or even general seizures[4]; more severe cerebral involvement results in mental disturbance and retardation.

Fortunately, associated visceral findings are rare but Zion[5] describes angiomata of the lung, G.I. tract, pituitary, ovary and pancreas. Unlike most of the other phakomatoses the hereditary nature of Sturge-Weber syndrome is not proven although a number of families show transmittance in incomplete and varying forms.[6] The disease is not uncommon and may affect all racial groups[5] with no sexual prediliction. The facial angioma is so pathognomonic that the alternatives for differential diagnosis are very limited, however in this case the lesion of the left hand is suggestive of the related Klippel-Trénaunay-Weber syndrome[7]. This was ruled out as there was no evidence of hypertrophy of the bone and soft tissue of the hand.

Conclusion

This young woman has been diagnosed as having Sturge-Weber syndrome with both an extensive cutaneous angioma and ipsilateral glaucoma yet without meningeal or other involvement thus representing Schirmer's form of the disease. Although she reports poor vision since birth the normal size of the eye and cornea suggest a later onset of the markedly elevated IOP. The IOP of the left eye is maintained at an acceptable level by medical means but lifetime compliance with such a regimen is unlikely. Surgical procedures for this type of glaucoma, which include goniotomy, trabeculotomy and cylocryotherapy, are effective in some cases.

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Ophthalmic Preparations of Interest to Optometrists

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D.C. Lutzi**

Editor's Note:

This paper is essentially a tabulated listing of nearly 200 ophthalmic preparations. It is too lengthy to publish in one issue of the CJO, so it will be presented in parts. The subject is tabulated in the following sections:

- **Tear Supplements and Substitutes, Comfort Solutions.**
- **Vasoconstrictors, Decongestants, Astringents and Antihistamines.**
- **Topical Antibiotic, or other Antibacterial Preparations.**
- **Mydriatics / Cycloplaegics or both.**
- **Ophthalmic Ointments.**
- **Enzymatic Cleaners, Proteases and Lipases.**
- **Thermal Disinfection and Rinsing of Soft Lenses, Storage Solutions.**
- **Chemical Cleaning and Disinfecting Solutions or Systems for Soft Lenses.**
- **Solutions Designed for Use With Hard Lenses.**
- **Solutions Designed for Use With Hard Gas-Permeable Lenses.**
- **Diagnostic Aids.**
- **Ocular Lubricants, Eyewashes, Irrigating Solutions, Cushioning Solutions or Ointments.**
- **Topical Anaesthetics.**
- **Hypertonic Solutions or Ointments.**
- **Drugs to Treat Glaucoma.**

Readers will also note that some preparations will appear under more than one of the above descriptive headings.

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6. Enzymatic Cleaners, Proteases and Lipases

Product (Manufacturer or Distributor)	Viscosity Agent	Vasoconstrictor	Preservative	Buffer	Purpose or Other Ingredients
Alcon Enzymatic Cleaner (Alcon)					Used to clean soft lenses. Contains pancreatin, a mixture of enzymes including lipases, amylases and proteases.
B & L Soflens Cleaning Tablets (Bausch & Lomb)					For removing protein from soft lenses. Weekly cleaning. Papain, Prolase 300.
Bilosa-Clean Tablets (Union Optics)			thimerosal, disodium edetate	citric acid, sodium bicarbonate	Cleaning soft lenses. Lipid solvents.
Clean-O-Gel (Alcon)	polyethylene glycol		thimerosal 0.001%, disodium edetate 0.1%	phosphate, sodium borate	For removing lipids and protein from soft lenses weekly. Lipase surfactant, sucrose monolaurate, boric acid and mannitol.
Gonio-Gel (Herdt and Charton)	methylcellulose 2.5% (4000 cps), propylene glycol		methylparaben, propylparaben		Lubricant and optical bond for use with a gonioscopic lens. Sodium chloride, purified water. Index of refraction 1.336.

7. Thermal Disinfection and Rinsing of Soft Lenses, Storage Solutions

Product (Manufacturer or Distributor)	Viscosity Agent	Vasoconstrictor	Preservative	Buffer	Purpose or Other Ingredients
Alcon Preserved Saline Thermal Disinfection and Rinsing Solution (Alcon)			thimerosal 0.001%, disodium edetate 0.1%	boric acid, sodium borate, phosphate buffer	Thermal disinfection and rinsing of soft lenses. Pluronic 127, detergent. Sodium chloride 0.7%. Isotonic.
Allergan Preserved Saline Solution (Allergan)			thimerosal 0.001%, disodium edetate 0.1%	sodium borate, boric acid, sodium hydroxide	For thermal disinfection and rinsing soft lenses. Sequestering agent and sodium chloride 0.85%.
Aquaflex Salt Tablets (Union Optics)					Thermal disinfection of soft lenses. Sodium chloride, 270 mg tablets.
B-H Soft Lens Buffered Salt Tablets (Barnes-Hind)			disodium edetate 0.2%	sodium bicarbonate, sodium phosphate, sodium citrate	Thermal disinfection and rinsing of soft lenses. Sodium chloride, chelating agents.
B-H Soft Lens Preserved Saline Solution (Barnes-Hind)			thimerosal 0.001%, disodium edetate 0.1%,	boric acid, sodium borate	For thermal disinfection, and storing of soft lenses. Sodium chloride. Isotonic. pH 7.0.
B-H Soft Lens Storage & Rinsing Solution (Barnes-Hind)			chlorhexidine gluconate 0.003%, thimerosal 0.002%, disodium edetate 0.1%	boric acid	Chemical disinfection, rinsing and storage of soft lenses. Conditioning agents and sodium chloride.
B & L No Thimerosal Saline Solution (Bausch & Lomb)			disodium edetate 0.025%, sorbic acid 0.1%	borate	For thermal disinfection, storing and rinsing soft lenses. Sodium chloride.
B & L Soflens Saline Cleaning Solution (Bausch & Lomb)			disodium edetate 2.5mg/ml (=0.25%), sorbic acid 1.5mg/ml (=0.15%)	borate	A saline rinsing, thermal disinfection and storage solution for soft lenses. Sodium chloride and surfactant. Isotonic.
B & L Soflens Saline Solution (Bausch & Lomb)			disodium edetate 2.5 mg/ml (=0.25%), thimerosal		For rinsing, thermal disinfection and storing of soft lenses. Sodium chloride.
Bilosa-Saline (Union Optics)			none		For rinsing and storing soft lenses. Sodium chloride in 10 ml sachets. Also available as a spray.
Boil-n-Soak (Alcon)			thimerosal 0.001%, disodium edetate 0.1%	boric acid, sodium borate	Preserved saline solution for thermal disinfection and for rinsing soft lenses. Sodium chloride 0.7%. Buffered, isotonic.
Flex-Care (Alcon)			thimerosal 0.001%, disodium edetate 0.1%, chlorhexidine gluconate 0.005%	boric acid, sodium borate, phosphate buffer	Chemical disinfecting solution used for rinsing and storing soft contact lenses. Sodium chloride. Isotonic. Tonicity about 289 mOsm.
Flexsol (Alcon)	povidone, polyoxyethylene glycol (Adsorbobase)		chlorhexidine digluconate 0.005%, disodium edetate 0.1%, thimerosal 0.001%	boric acid, sodium borate, phosphate buffer	Storing, chemical disinfecting and conditioning solution for soft contact lenses. Water soluble polymers and sodium chloride. Isotonic.
Hydrocare Sorbisal Saline Solution (Allergan)			sorbic acid 0.1%	buffers	For thermal disinfection, rinsing and storing soft lenses. Contains a calcium preventer and sodium chloride. Isotonic.
Hydrocare Special Saline Solution (Allergan)			thimerosal 0.001%, disodium edetate 0.01%	boric acid, sodium hydroxide	Thermal disinfection and calcium preventer saline for soft lenses. Sequestering agent and sodium hexametaphosphate. Isotonic.
Hydrosoak (Trans-Canada Contact Lens)			thimerosal 0.0025%, disodium edetate 0.1%, chlorhexidine gluconate 0.0025%		For storing and chemical disinfection of soft contact lenses. Isotonic.

Product (Manufacturer or Distributor)	Viscosity Agent	Vasoconstrictor	Preservative	Buffer	Purpose or Other Ingredients
Lensrins (AOCO) (Softcon)			thimerosal 0.001%, disodium edetate 0.1%	phosphate buffers	Preserved saline solution for thermal disinfection, rinsing and storing soft lenses. Sodium chloride 0.85%.
Normal Saline Salt Tablets (Prof. Supplies)					To make saline solution for rinsing, thermal disinfection and storing of soft lenses. Sodium chloride (200 tablets each 250 mg).
Normol (Alcon)			chlorhexidine gluconate 0.005%, disodium edetate 0.1%, thimerosal 0.001%	borate	Rinsing solution for soft lenses. Sodium chloride. Isotonic.
Nutra-Flow (CooperVision)			sorbic acid 0.1%, disodium edetate 0.1%	sodium borate 0.22%	To rinse and store soft lenses. Solution used with Pliacide to neutralize iodine when disinfecting soft lenses chemically. Contains potassium chloride.
Perma-Sol (CooperVision)			thimerosal 0.001%, sorbic acid 0.1%, disodium edetate 0.1%	sodium borate 0.2%	Saline solution for rinsing, storing and thermal disinfection of soft lenses. Sodium chloride 1%, potassium chloride.
Pliasol (CooperVision)			sorbic acid 0.1%, disodium edetate 0.1%	sodium borate 0.2%	Thermal disinfecting, rinsing and storing of soft lenses. Poloxamer 407, sodium chloride 0.6% and potassium chloride 0.2%.
Soft Mate PS Saline Solution (Barnes-Hind)			potassium sorbate 0.13%, edetate sodium 0.025%	boric acid, sodium borate	Rinsing, soaking and storing solution for soft lenses. Sodium chloride.
Soft Rinse (Prof. Supplies)			none		Saline solution for rinsing, thermal disinfection and storage of soft lenses. Sodium chloride (250 mg tablets). Also 135 mg tablets are available.
Solusal (Hydron Canada)			none		For rinsing, storing and thermal disinfection of soft lenses. Sodium chloride 0.90% w/v.
Unisol Preservative-Free Saline Solution (CooperVision)			none	boric acid 0.5%, sodium borate 0.05%	Rinsing, thermal disinfection and storage of soft lenses. Sodium chloride 0.7%. The same formulation is also in Unisol 4 Sterile Saline Solution.

8. Surfactant Cleaners for Soft Lenses.

Product (Manufacturer or Distributor)	Viscosity Agent	Vasoconstrictor	Preservative	Buffer	Purpose or Other Ingredients
B-H Cleaning Solution for Gas-Permeable Hard Contact Lenses (Barnes-Hind)	hydroxyethylcellulose		thimerosal 0.004%, disodium edetate 2%	trisamino	For cleaning rigid gas-permeable lenses. Nonionic surfactant.
B-H (Sterile) Soft Lens Cleaning Solution (Barnes-Hind)	hydroxyethylcellulose, octylphenoxy ethanol		thimerosal 0.004%, disodium edetate 0.2%	boric acid, sodium borate	Cleaning soft lenses. Nonionic surfactant (Igepal) and sodium chloride. pH 8.2. Isotonic.
B-H Soft Lens Weekly Cleaning Solution (Barnes-Hind)			thimerosal 0.001%, disodium edetate 0.1%		Cleaning soft lenses weekly. Nonionic amphoteric surfactants. Norfox, Miranol, Silicone. Isotonic. pH 8.0.
B & L Daily Cleaner (Bausch & Lomb)			thimerosal 0.04%, disodium edetate 0.2%		Daily cleaner for soft lenses. Surfactants.
Boston Lens Cleaner (Polymer Tech Corp)					Cleaning rigid gas-permeable and other hard lenses. Anionic, sulfate surfactant, sodium chloride.

Product (Manufacturer or Distributor)	Viscosity Agent	Vasoconstrictor	Preservative	Buffer	Purpose or Other Ingredients
Clean-O-Gel (Alcon)	polyethylene glycol		thimerosal 0.001%, disodium edetate 0.1%	phosphate, sodium borate	For removing lipids and protein from soft lenses weekly. Lipase surfactant, sucrose monolaurate, boric acid and mannitol.
Hydrocare Cleaning/ Disinfecting Solution (Allergan)			alkyl triethanol ammonium chloride, thimerosal 0.002%	buffers	Cleaning, disinfecting and storing soft lenses. Surfactants and a polymer vehicle. Isotonic.
Hydroclean (Trans-Canada Contact Lens)			thimerosal 0.0025%, disodium edetate 0.1%, chlorhexidine gluconate 0.0025%		Daily cleaner for soft lenses. Surfactants. Isotonic.
LC-65 Daily Contact Lens Cleaner (Allergan)	polysorbate 80		thimerosal 1:100,000 =(0.001%), disodium edetate 0.1%	sodium phosphate	Daily cleaner for hard, hydrogel and hard gas-permeable contact lenses. Amphoteric nonionic surfactant, (Miranol), stabilizers and sodium chloride.
Mira-Flow (CooperVision)			isopropyl alcohol 20%		Cleaning soft lenses. Miranol, amphoteric surfactant, Poloxamer 407.
Oxycare (Trans Canada)					Weekly cleaner for soft lenses and for hard gas-permeable lenses. Contains sodium percarbonate, no enzymes.
Pliagel Cleaning Solution (CooperVision)			sorbic acid 0.1%, trisodium edetate 0.5%		Daily cleaning of soft lenses. Nonionic surfactant, detergent, poloxamer 407 1.5%, potassium chloride and sodium chloride.
Polyclens (Alcon)	hydroxyethylcellulose, oxyethylene, octyphenol		thimerosal 0.004%, disodium edetate 0.1%	borate buffer, sodium chloride, sodium hydroxide	Daily cleaning of soft, hard and gas-permeable lenses. Surfactants, Tween 21 and microscopic polymeric beads designed to remove protein and lipids.
Preflex (Alcon)	hydroxyethylcellulose, polyvinyl alcohol, oxyethylene, octyphenol		thimerosal 0.004%, disodium edetate 0.2%	phosphate	Daily cleaner for soft contact lenses and for hard gas-permeable lenses. Nonionic surfactants, Tyloxapol and sodium chloride. Isotonic.
Softcon Lens Cleaner (AOCO) (Softcon)			thimerosal 0.004%, disodium edetate 0.1%	phosphates	For cleaning soft lenses. Contains a proprietary surfactant. Pluronic, poloxamer. Sodium hydroxide or hydrochloric acid to adjust pH. Isotonic.
Soft Mate PS Daily Cleaning Solution (Barnes-Hind)	hydroxyethylcellulose, octylphenoxyethanol		potassium sorbate 0.13%, disodium edetate 0.2%		Cleaning soft lenses. Nonionic surfactant, sodium chloride and chelating agents.

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1. Data on file. Barnes-Hind Inc. 2. Sagan and Rheam. Int. Contact Lens Clinic, 1984.

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CONTACT LENS

Prismatic Effects of Iseikonic Spectacle-Contact Lens Telescopic Systems

A. Remole*

Abstract

The method of correcting aniseikonia in unilateral aphakia by means of a spectacle-contact lens combination has been described in detail in the literature. This article addresses one consequence of such corrections, namely, the induced prismatic effect. A comprehensive formula is developed to show how this effect compares with the aniseikonia corrected.

Introduction

When the crystalline lens is removed in cataract surgery, the optical constants of the eye change radically. A higher power aphakic spectacle correction pulls the principal planes forward, increasing the equivalent focal length of the combined optical system. Because the retinal image is proportional to the second focal length of this system, it becomes much larger than in the normal eye, usually by about 25%[1].

When the aphakic eye is corrected with a contact lens, the principal planes move forward to a lesser extent. However, even with this type of correction, they are translated a rather significant amount from within the aqueous chamber to become situated approximately in the plane of the contact lens. The result is that the retinal image is still magnified considerably, about 7.5% in the standard eye. When only one eye is aphakic, this magnification difference will result in a very significant amount of aniseikonia.

Enoch[2,3] developed an excellent method of correcting aniseikonia in unilateral aphakia. Essentially, it consists in placing a reversed Galilean telescope before the aphakic eye, incorporating the "objective" of the telescope in a contact lens, and the negative "eye piece" in a spectacle correction. In addition to the power representing the "objective", the contact lens would contain plus power to correct the ametropia of the aphakic eye. Conversely, a conventionally oriented telescope can be prescribed for the phakic eye, designed to enlarge the retinal image to match that of the aphakic eye. The phakic eye, even if emmetropic, would then have to be fitted with a contact lens to contain the "eyepiece." Also, the iseikonic correction can be distributed between these two types of spectacle-contact lens telescopes.

The purpose of this paper is to illustrate and discuss a potential problem inherent in this method of correcting aniseikonia. The literature already contains detailed accounts of the principles pertaining to the procedure. Nevertheless, before we can proceed, it will be necessary to review its most salient features.

In Fig. 1, the portion of the contact lens representing the objective of the Galilean telescope has been shown, for illustrative purposes, as separate from the portion of the contact lens correcting the ametropia. For simplicity, the thickness of the spectacle lens and contact lens has been ignored. The spectacle lens and the "objective" portion of the contact lens can then be treated as front and back surfaces of a lens whose thickness is *t* and refractive index, 1.000 (air). The spectacle magnification produced by this "air-lens" can be found by the conventional formula:

$$SM = \left(\frac{1}{1 - \frac{t}{n}F_1}\right)\left(\frac{1}{1 - dF_v'}\right)$$

where, in general:

SM = spectacle magnification
t = thickness of lens
F_1 front surface power
d = vertex distance
F_v' = back vertex power of lens

The two factors are the well known "shape" and "power" factors, respectively.

If we apply the general formula to the spectacle-contact lens Galilean telescope, n becomes 1.000, and t becomes the distance between the two lenses, say 15 mm. F_1 in the formula becomes identical to the back vertex power of the thin lens. Since we are

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designing an afocal system, F_V' becomes zero. If we let the back vertex power of the required spectacle lens "eye piece" = S_V', then:

$$\left(\frac{1}{1 - t(S_V')}\right)\left(\frac{1}{1 - d(0)}\right) = \frac{1}{M}$$

where M is the compensating magnification required before the phakic eye. Solve for S_V':

$$1 - t(S_V') = M, \text{ and, } S_V' = \frac{1 - M}{t} \quad (I)$$

The question might arise why $\frac{1}{M}$ has been used in the development of the equation rather than -M. If we find, by measuring the aniseikonia, that the phakic eye needs, say, 7.5% to bring about iseikonia, then it is a good clinical approximation to assume that the same effect can be achieved by placing a -7.5% telescope before the aphakic eye. Using this value in the above derivation would, in fact, have resulted in an approximate but workable formula. However, it is more accurate to specify the power of the reversed telescope as $\frac{1}{1.075} = 0.9302$ or -7.00%. In the development of the formula, we have used this more exact relationship.

Illustrative Example

By testing a patient with unilateral aphakia, it is found that 7.5% magnification is needed over the phakic eye to produce iseikonia. If the vertex distance is 15 mm, find the constants of an iseikonic reversed Galilean spectacle-contact lens telescope.

From formula (I), the back vertex power S_V' of the required minus spectacle lens is:

$$S_V' = \frac{1 - 1.075}{0.015} = -5.00\text{D}.$$

The effective power of this lens at the cornea is:

$$\frac{-5.00}{1 - \left(\frac{0.015}{1.000}\right)\left(-5.00\right)} = -4.65\text{ D}.$$

To make the spectacle-contact lens afocal, +4.65 D will therefore have to be added to the ametropia contact lens correction.

If the patient were previously emmetropic, a zero back vertex power spectacle lens is, of course, placed before the phakic eye. The procedure for prescribing a conventionally directed Galilean telescope before the phakic eye is similar to that set out above and does not need to be dealt with in this review.

Dynamic Aniseikonia

When aniseikonia is induced by a contact lens prescription, the two ocular images differ in size. However, if aniseikonia is induced by an anisometropic spectacle correction, not only is there an ocular image size difference, but in addition, because the spectacle lenses do not follow the eyes, differential prismatic effects are constantly produced. When both eyes look up, one eye has to move farther than its mate because the primary image formed by the spectacle lens in the far point plane is larger than the other. When the eyes look downwards, the same eye now has to rotate farther downwards than its mate (Fig. 2). This problem exists in all meridians.

The effect was first described by Jackson[4] and has been investigated by many others. He proposed that the discomfort experienced in aniseikonia springs from this effect rather than from the differences in retinal images. Von Rohr[5] and Erggelet[6] drew similar conclusions. On the other hand, Ogle[7] considered the effect of secondary importance to the difference in ocular images. He based his conclusion on evidence that the oculomotor mechanism at least partially adapts to the prismatic effects (Ellerbrock and Fry[8]; Cusick and Hawn[9]). Ellerbrock[10] and Allen[11] showed that there is ample ability to adapt to vertical prism. Henson and Dharamshi[12] investigated the prismatic effect caused by anisometropic spectacle corrections in all meridians. They found that for an anisometropia of up to 4.50 D, the oculomotor system was able to adapt if given enough time.

However, when we consider differential prismatic effects in anisometropia, we have a situation in which these effects are constantly changing across the fixation field. We have the choice of specifying the different prismatic effects at given distances from the optical centre of the lens, or, we can develop an expression that will yield a single value for the entire fixation field. This can be achieved if we realize that the prismatic effect is simply a consequence of the difference in sizes of the primary images formed by the lenses in the far point planes. This concept of the prismatic effect reveals an unmistakable similarity with ocular image differences in aniseikonia. We have chosen the term *dynamic aniseikonia* to designate the prismatic effect expressed in terms of the size difference between the primary images. *Dynamic* pertains to the constant motion of the eyes as they fixate the various points in the stationary primary image. In contrast, we use the term *static aniseikonia* to refer to ocular image differences, *static* referring to a theoretically stationary retinal image.

The term *dynamic aniseikonia* has several advantages aside from the primary purpose of expressing prismatic effects in magnification terms. Thus, it emphasizes that the effect occurs in all meridians, not just at the reading point. Also, it eliminates the common notion that the prismatic effect is incidental to the prescription. Dynamic aniseikonia is a magnification difference that describes the entire fixation field at once, whereas prismatic effect must be stated as a different value for every location of the spectacle lens.

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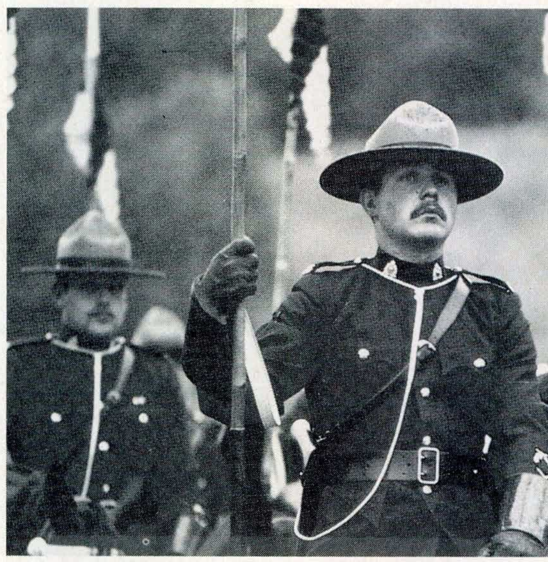

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In the following, we shall determine the amount of dynamic aniseikonia that can be induced by a contact-spectacle lens reversed Galilean telescope.

Dynamic Aniseikonia Induced by a Contact-Spectacle Lens Iseikonic Unit

The reversed Galilean telescope described above can be designed to eliminate static aniseikonia completely. However, since the spectacle lens is stationary, it will induce dynamic aniseikonia that did not previously exist. We have traded the static aniseikonia for a certain amount of dynamic aniseikonia, the magnitude of the latter depending on the dioptral difference between the two spectacle lenses. Enoch, in his pioneer article[2], was fully aware of the effect and gave recommendations how to treat it. However, because of the necessary emphasis in his article on the telescopic correction, relatively little space was devoted to the prismatic effect.

Assume a hypothetical case where a -5.00 D spectacle lens is combined with its appropriate contact lens "objective" before the aphakic eye, as in the above example. The spectacle lens is mounted 15 mm from the contact lens and 25 mm from the centre of rotation of the aphakic eye. An ideal iseikonic correction would result if the phakic eye happened to be -5.00 D myopic: if aberrations are ignored, neither dynamic nor static aniseikonia would be present.

Suppose, however, that the phakic eye is emmetropic and has been prescribed with a zero power balance lens. If the patient looks to the side, or up or down, 10 mm along the spectacle plane from the major reference point, a prismatic effect of 5^{Δ} would be produced (Prentice's rule). This is equivalent to an angular displacement of $\tan^{-1} 0.05 = 2.8624°$. The subtense of the semifield defined by 10 mm of eccentricity is $\tan^{-1} \frac{10}{25} = 21.8014°$. The corresponding field in object space is $21.8014° + 2.8624° = 24.6638°$. The resulting minification is therefore $\frac{21.8014°}{24.6638°} = 0.8839$. To offset the resulting magnification difference, the primary image seen by the phakic eye would need a magnification of $\frac{1}{0.8839} = 1.1313$. We have traded a static aniseikonia of 7.5% for a dynamic aniseikonia of 13%.

Approximately the same result can be obtained by adapting the general formula for the spectacle magnification to the centre of rotation. This is achieved by replacing the constant *d* with *s*, the distance between the lens and the centre of rotation, 25 mm in our example. Assuming for simplicity that one spectacle lens is of zero back vertex power, the ratio of the images in the far point planes, M_d, becomes:

$$\left(\frac{1}{1-\left(\frac{t}{n}\right)F_1}\right)\left(\frac{1}{1 - s\,F_v'}\right) \quad \text{(II)}$$

If the thickness of the spectacle lens is ignored:

$M_d = \left(1\right)\left(\frac{1}{1 - 0.025(-5.00)}\right) = 0.8888$, which yields a dynamic aniseikonia, DA (required iseikonic correction) of $\frac{1}{0.888} = 1.1251$, or 12.5%. The slight discrepancy with the previous value derives from the use of Prentice's rule in the former example.

A simple expression for the dynamic aniseikonia induced by the telescope can be derived from Fig. 3:

Ratio of far point images = M_d = $\frac{\text{Field of view produced by spectacle lens}}{\text{Field of view in object space}}$

The fields are approximately proportional to the tangents formed by y, the eccentricity, s, the stop distance, and s', the conjugate of the stop distance, tracing the light backwards from image space to object space. Thus:

$M_d = \left(\frac{y}{s}\right)\left(\frac{s'}{y}\right) = \frac{s'}{s}$, and, DA (required correction) =

$$\frac{1}{M_d} = \frac{s}{s'} \quad \text{(III)}$$

$\frac{1}{s'} = \frac{1}{s} + F$ (Paraxial formula) Substituting in (III), we get:

$DA = s\left(\frac{1}{s} + F\right) = 1 + sF$ (IV) For a stop distance of 25 mm:

$$DA = 1 + \frac{F}{40} \quad \text{(V)}$$

Applying (V) to the previous example:

$DA = 1 + \frac{-5.00}{40} = 1 - 0.125 = 0.8750$. Therefore, the magnification required before the phakic eye $= \frac{1}{0.875} = 1.1428$, or about 14%. The discrepancy between this value and that obtained previously results from substituting tangents for angles.

It must, of course, be borne in mind that the above expressions refer to the difference between the left and right lenses. If the lens before the phakic eye has a power other than zero, the difference between the two powers would apply as above.

Had we chosen to express the dynamic aniseikonia in terms of prismatic effects, we should need a graph or table showing the effect at the various points of the lens rather than a single value describing the entire lens. In this sense, the new formula is more comprehensive. Should we desire to convert the dynamic aniseikonia to its prismatic effect equivalent at a point on the lens, the following relationship can be used:

$d\,\Delta = \frac{c}{s}(DA - 1)$ (VI) where:

$d\Delta$ = differential prismatic effect

c = eccentricity in cm

Conversely, the dynamic aniseikonia can be calculated from the measured prismatic effect at a point in the lens as follows:

$$DA = 1 + \frac{d\Delta(s)}{c} \qquad (VII)$$

Having established a set of expressions for dynamic aniseikonia, we now turn to the spectacle-contact lens telescope discussed above. The induced dynamic aniseikonia can range from zero in the ideal case to a very large value. Figure 4 illustrates the increase in induced dynamic aniseikonia with difference in power between the spectacle lenses. This relationship, shown in the form of the diagonal straight line, is based on the approximate formula above (V). The horizontal line represents static aniseikonia of 7.5% as found with the standard eye. The grey horizontal zone represents the region within which most cases of aphakic aniseikonia would fall.[13]

Discussion and Conclusions

It is seen from the graph in Fig. 4 that, in the case of the standard eye, the dynamic aniseikonia becomes numerically equal to the static aniseikonia when the difference in power between the two spectacle lenses is 3.00 D. For a difference of 8.00 D., the dynamic aniseikonia becomes 20%, or almost three times as great as the static aniseikonia neutralized by the prescription.

It is to be noted that the graph is based on paraxial optics and therefore does not include the effect of prismatic aberrations. These aberrations generate a nonuniform magnification effect over and above the effect shown, that is, an exponentially increasing magnification or minification towards the periphery of the lens. This also applies to the prismatic effect, which deviates more and more from Prentice's rule away from the optical centre. The graph is, however, a good first order approximation to the induced dynamic aniseikonia in a spectacle-contact lens correction.

The overriding conclusion from the foregoing is that the dynamic aniseikonia induced by a contact-spectacle lens iseikonic telescope is of a much larger order than indicated by isolated calculations of the prismatic effect. This has become clear only after we have expressed size differences between primary images in the far point planes as magnification values rather than prismatic effects.

However, the criteria for evaluating and managing dynamic aniseikonia in a clinical setting differ from those pertaining to static aniseikonia. The seemingly large magnitudes of the induced dynamic aniseikonia do not necessarily detract from the usefulness of the spectacle-contact lens correction. As already has been pointed out in the foregoing, the oculomotor system has considerable ability to adapt to dynamic aniseikonia. Henson's data in particular[12], show that such adaptation occurs at least up to an eccentricity of about 20°, and at least for dioptral differences of up to 4.50 D, which corresponds to a dynamic aniseikonia of $1 + \frac{4.50}{40} = 1.1125$, or about 11%. At the Aniseikonia Clinic of the University of Waterloo, unilateral aphakics have been corrected successfully with the contact-spectacle lens telescope inducing a dynamic aniseikonia of up to 17%, even without the aid of a slab-off lens. These comments may remove much of the hesitation to prescribe such a correction that we may, inadvertently, have produced with our account of dynamic aniseikonia.

Nevertheless, many questions remain with respect to the clinical management of dynamic aniseikonia. Partly, this is because it has been deemed secondary to the static aniseikonia, and, partly, because it has been obscured somewhat by the application of Prentice's rule to a few selected locations on the lens.

One such question is that, although the oculomotor system adapts more readily to dynamic aniseikonia than the binocular perceptual system adapts to static aniseikonia, does this mean that visual comfort is also more readily achieved with the former? A study by Remole[13] shows that if equal amounts of dynamic and static aniseikonia (5%) are compared over the short term (5 min or less), before any considerable amount of adaptation takes place, dynamic aniseikonia is significantly more uncomfortable that static aniseikonia. It does not follow, of course, that dynamic aniseikonia will remain the more uncomfortable once adaptation has taken place. At the time of writing, we simply do not have the answer, although clinical experience seems to suggest that patients who adapt to dynamic aniseikonia are also comfortable with the situation.

We believe the separation of the effects produced by an anisometropic correction into static and dynamic aniseikonia will clarify the approach to further research in the area. A next logical step would be to compare the long term effect of the two kinds of aniseikonia on visual comfort.

While more information about dynamic aniseikonia is pending, it is advisable to approach the application of the spectacle-contact lens correction with extra caution when a large amount of aniseikonia is induced. This would include evaluation of the patient's binocular oculomotor performance and the possible application of slab-off lenses. After the fitting, a close monitoring of symptoms of dynamic aniseikonia, such as, for example, diplopia, would be in order. In general, a more thorough follow-up would be called for.

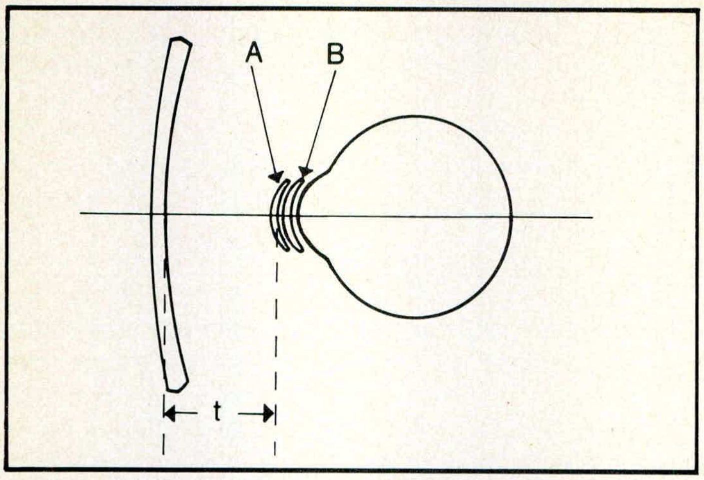

Fig. 1. Iseikonic reversed Galilean telescope prescribed for the aphakic eye in unilateral aphakia. A, "objective" portion of contact lens; B, ametropia portion of contact lens. For details, see text.

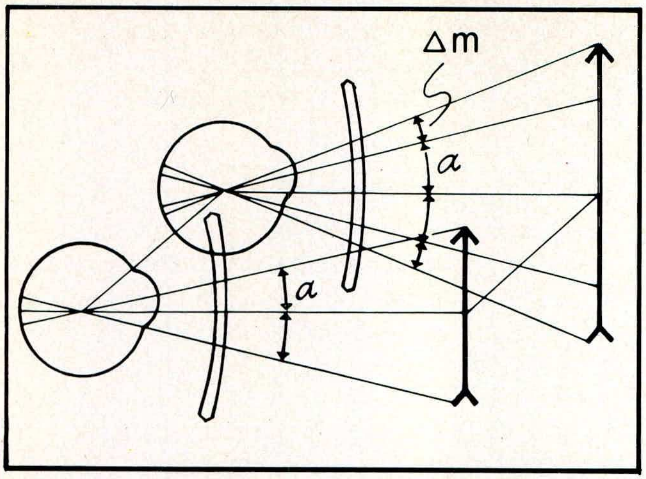

Fig. 2. Dynamic aniseikonia induced by an anisometropic correction. The eye presented with the larger image in the far point plane has to move an extra amount, Δ m, where m = magnification.

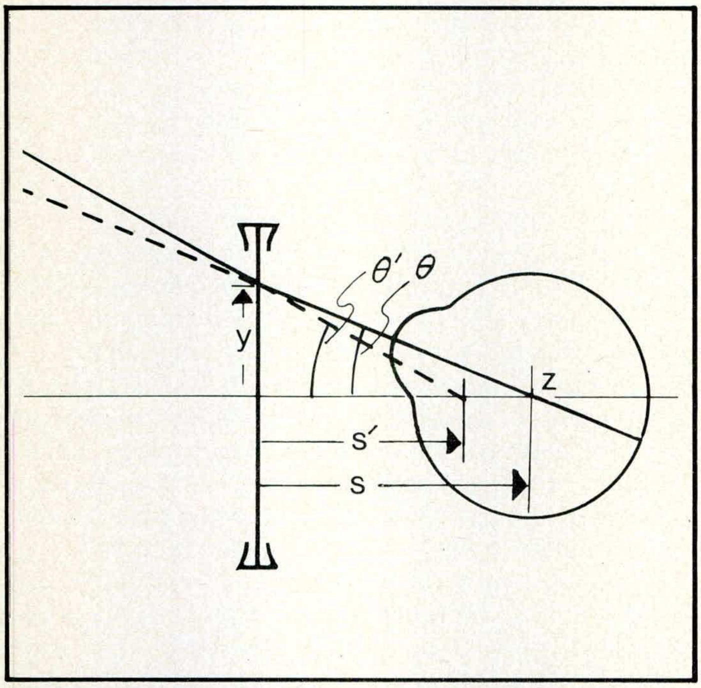

Fig. 3. Illustration used to derive the expression for dynamic aniseikonia. y, eccentricity of ray; s, stop distance; s', image of stop distance formed by the spectacle lens when the light is traced backwards from the centre of rotation (z) of the eye. Θ, field imaged by spectacle lens; Θ', conjugate field in object space.

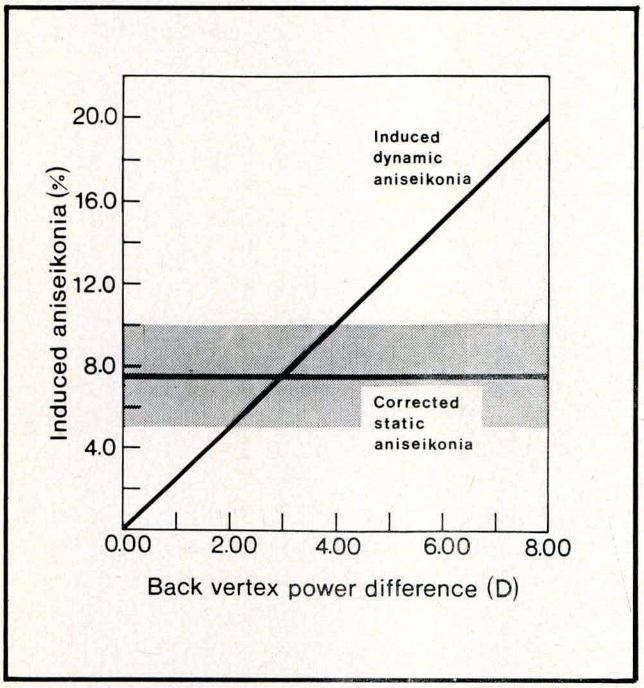

Fig. 4. Graph showing the relationship between the dynamic aniseikonia and the difference in power between the spectacle lenses used in the iseikonic telescope prescription. The induced aniseikonia refers to the required aniseikonic correction, for this is how aniseikonia is most often specified. For details, see text.

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OPINION

Wanted: Effective Optometric Education
You Can't Please Everyone; You Can't Do Everything; The Time has Come to Probe the Perspectives.

H. Feeley*

Today, we are hearing much about the need to re-evaluate the present status of optometric education. We hear that we have narrowed our vision into medically-oriented parameters.

Alas, the "uniqueness of optometry" is now a goal of blurred focus! But is the answer that alternatives are needed or merely a change of orientation?

There are those who are happy to see things stand as they are, because they are currently working. Beyond the immediate issue of the fee for vision assessment, adjusted to cost-of-living increases, concern of government funding of health and education does not attract their attention.

There is also a steadily increasing aggregate whose attention is rigidly maintained on the practical aspects of professionalism. But, in tough economic times, an innovative purist policy is disenchanting in the face of entrepreneurial downgrowth.

My intention is not to defend any of these viewpoints. It is, rather, to look ahead, to appraise today's options with a view to tomorrow's policies and to offer ideas for effective action.

Are you, as an optometrist, able to calculate cost effectiveness or make a cost benefit analysis before buying a new diagnostic tool? Did your school teach you to do this?

Do you know how to interact with bankers, attorneys, building contractors, architects and property managers?

How will you alter your practice as it is affected by a changing distribution in age, socio-economic status and racial composition of the population?

Do you know how to plan, conduct and interpret a health care market analysis?

How much education did you get in cost containment and health economics? As a student, were you made conscious of the costs of optometric services? Are you now? Did you ever discover, or were you ever told, whether this service was available at a lower price elsewhere? (The Department of National Defence currently hires retinoscopy technicians as ophthalmology aids.) Learning to restrain your fees will be important knowledge when you are faced with the fact of your services being a taxable employee health benefit. When you affiliate with a group practice or clinic, are you aware of the running costs, including support staff? Do you know what it costs to repair the diagnostic equipment you use but did not have to buy?

What happens in the event of physical disability?

Have you ever had any formalized lifestyle management training? Practice management alone is not sufficient. Types of practices, part-time practices and optometry as a temporary career (say as a prelude to political involvement) are all valid topics for consideration.

Exposure to a working optometric practice may provide the student optometrist with valuable insight into the problems and rewards of an optometric career. Is it feasible to have students spend some of their school year in actual optometrical practices? What about the value of observing the wise use of para-optometrical personnel, or its opposite, an office run with no ancillary staff whatsoever?

Is there a need to teach optometrists how to counsel their patients? Pre-surgical cataracts and low vision are both stress producing situations. The optometrist is in a position to teach such patients to help themselves as far as possible rather than rely on others. By using learned techniques of identifying and defining problems, behavioural analysis, stress reducing skills and dealing with depression, the optometrist need not rely on referral to a psychotherapist.

The importance of nutrition in eye health is barely touched upon in the present curriculum. Pediatric and pathology courses make only passing mention of it and yet, in our offices, we may regularly encounter people experimenting with vegetarianism, isolated dwellers lacking Vitamin C and fad dieters.

If one is to create such a thorough curriculum, the problem becomes one of designing an optometrical education program that not only maintains the best

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that it presently offers, but also includes training in many of the non-optometric, but equally necessary practice skills. There is, however, no consensus of direction. Do we want to experiment with our optometrical education process? If so, in which areas: philosophy or methodology? And, if we decide on a change, how will we predict the outcome, and what methods do we have of evaluating the change systematically? Suppose we downgrade some aspect of current optometric education, say, ocular pathology — could we retrace our steps if it turns out to be a bad decision?

As an institution for optometric studies, a university devoted mainly to engineering and computer sciences provides not only a solid scientific foundation but, oddly, a highly medical one. In a university setting where the scientific foundation is more broadly based than a medical school, students may avoid the situation of having faculty highly specialized in providing only a medical curriculum. Because of our original conflict with medicine, we approached optometric education with the attitude of getting it out of the medical environment, but now we may need to examine the possibility of establishing a new relationship. For example, a person trained in optometry and teaching pharmacology will not have an understanding comparable to someone trained in medicine with a subspeciality in pharmacotherapeutics.

Medicine has already begun to rethink its student selection process. The holistic health movement is a growing reaction to what are perceived as increasingly uncaring orthodox medical practitioners. Now look at optometric education. The scholastic program is mapped out for students on a day-by-day, hour-by-hour basis. They very seriously apply themselves to the agenda in much the same way as a 1940's optometrist worked through the properly numbered sequence of the OEP examination. They have impressive B.Sc. or science backgrounds, but how many are idealistic, enthusiastically humanistic people? But then, how much of their education even considers a holistic approach to patients? What good is correctly prescribing a flat-top bifocal for a ten-year old, without attention to the significance of that child's emotional reaction to it? How often will an optometrist consider the potential change in personality that a first pair of glasses may cause?

In addition to producing a qualified optometrist, the optometric educators should set themselves the secondary goal of graduating an empathetic practitioner. The future optometrist will be required to display a basic capacity to relate to increasingly inquisitive patients. The "mystery" of health care is no longer blindly accepted as such by an educated public. They want to know what is happening — not only regarding their problems, but also what is being accomplished by a particular corrective measure.

How do we go about producing the graduate who can effectively deal with the patient as a person, not merely as a case? To start, some of the students' day or week may be given over to discussion with staff members about how the various departments in the school are run, what problems have arisen and how they have been solved. Not only will insights into an academic optometrist's life develop, but insights into optometry in general. Insights into oneself and, ultimately, into the future patients' lives will follow.

As modern data gathering techniques are more and more switched to electronic methods, M.D.'s are spending less time listening to their patients, but will shunt them from one specialized technician to another. Optometrists can still deal with people on a one-to-one basis throughout the visual assessment.

This is not to advocate going too far the other way! Compassion is a component of our care, but most patients will still come to us to identify a specific problem and to have it treated quickly and efficiently. Our knowledge of scientific skills, in other words, must not be diluted by over-attention to the more nebulous art of dealing with people. Underdeveloped as it is, psychological training should not supersede our scientific training. Behavioural science will be important to the training of the future optometrist, but optometric education is basically a physical science and, even though scientific and technical data are bound to change, the premise of aiming for precision stands.

The large part of the optometric student's education should be designed so as to allow self-teaching. Post-graduate courses, continuing education and audio-visual cassettes are all useful methods. But even more important is the training of techniques. Education is always evolving and what is learned in school today can be re-evaluated tomorrow by entirely new data. Optometrists today must be capable of structuring their own learning to keep up with this new data, even if they never see another teacher. By extension, this necessitates a familiarity and capability with modern research methodologies, like library usage skills, including reference assistance, interlibrary loans, computerized literature searching, audio-visual programs and computer assisted instruction. It is valuable to know how to use current literature to answer specific questions, how to find the relevant published article, read it critically and appreciate areas of controversy.

One cannot address a subject like optometric education without considering its cost. But how is the funding to be allocated? How much should go to research which produces no immediate benefits? Research is expensive, but one means of saving money is to restrict the use of expensive diagnostic tools. Students, for example, can still be taught how to gauge intraocular pressure by palpation and the use of the simpler tonometers, rather than by routinely getting readings by Goldmann or air-puff methods.

On one issue, however, there can be no question of pinching pennies. Expensive or not, optometric education must be thoroughly involved in computer technology to educate for the future. The microchip revolution is over — it *governs* us today. But there comes a point at which the new technology is too expensive for any individual optometrist's use. At the institutional level, however, research will, and should, continue to make available new diagnostic and therapeutic technologies. Students must be educated in these areas, even though they themselves may seldom get access to such sophisticated equipment. Ongoing high-tech research into vision at the school will acquaint the student with future trends and the need to evaluate present practice in such terms.

High-tech is not solely applicable to academic research within the school, however, — another component is microcomputer education for the practitioner. As a teacher, the computer is useful in reducing the need for full-time access to teaching personnel. Further, a computerized tutorial can be structured to the benefit of the student requiring an individualized program because of factors such as insufficient background teaching, absenteeism or a need for remedial aid. There are already health education packages commercially available.

Simulation techniques, when programmed into computers, are less expensive and less time-consuming than to bring in patients with known diseases. The computer becomes both simulated patient and individual instructor. By working towards the development of computerized instruction, educators will acquire the ability to assess the efficacy of such instruction and to make recommendations about the design of future studies. Computer-based instruction is a step toward computer-based research design.

Another teaching method under-utilized by the optometric profession is the writing and publishing of case reports, either alone or in collaboration with another author. One of the requirements of acquiring fellowship status is the submission of case reports. Reporting unusual cases puts the average optometrist in the role of an occasional teacher and one needs to know what relevant points to cover as well as how to inject some style into the writing. Submitting it in proper form, use of illustrations and graphs, purchasing reprints and copyright are all aspects requiring precise knowledge.

What is required to communicate with an audience who lacks the understanding of one's professional peers? Very few optometrists have had any direct experience in dealing either with government or with other health professionals in a government setting. Even the wording of a simple statement can be a forbidding exercise to a practitioner the first time it is asked of him or her. One has to take into account the different information needs of the public, federal and provincial governments, private insurers and even hospitals and other health care facilities.

It becomes clear that we need to have more knowledge of sociology, communications, economics, epidemiology, appropriate sections of the law and the functioning of government.

In our schools, we need to develop leaders who will be capable of convincing government of the need to support scientific inquiry. As part of a university, optometric education is, by definition, engaged in educational research. Research has overhead costs not usually considered by most government grants and the optometrist needs a certain amount of accounting expertise to define the parameters of these expenditures.

New research money, as it happens, is getting more and more difficult to acquire. As a result, some very worthwhile projects are simply not being initiated. One solution might be found in a pooling of interdisciplinary resources. Some curriculum subjects are relevant to all or most of optometric, medical, pharmacy, dental, nursing and bioengineering students. Pharmacology and pathophysiology are two examples of knowledge which can be lectured on a rotating basis. Students could attend the lecture at a teaching hospital or, alternatively, staff from the medical (or other) faculty could travel to the students and stay for periods of one to four months per year.

If research efforts continue to be frustrated because of lack of funding, faculty turnovers may begin to occur at a rate which will disrupt both the functioning of the school and students' educational programs. There will also be a removal of accumulated administrative expertise. The benefit to students of clinical and teaching faculty members who exercise a strong role-modelling effect will also be lost as lengthy or frequent sabbaticals are taken. A student no longer sees any incentive at all to pursue a research or teaching career.

If necessary, optometric educators may need to advocate a change in the health care system itself. The system may be saying to the profession, "If you can't reform yourself, then I will reform you."

It is time to start teaching the students some negotiating skills. We may not be speaking with one voice as a homogenous group, but we all have to co-operate nationally to insist on a curriculum which will meet the demands of tomorrow's graduate. There are no alternatives. The public will let us know if we don't.

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Optica '84 — Cologne Ophthalmic Trade Fair

G.M. Belanger*

Optica '84 held in late May, was a great success not only for the exhibitors and the organisers, but also for the more than 20,000 visitors who came to this year's visual feast of what is new in the ophthalmic industry. There was something for everybody.

It began in 1973 in Karlsühe when the Association of the German Mechanics and Optical Industry sponsored an exhibition to show their products to the German public, as well as to industry in general. From an initial 161 exhibitors cramped into a display area of 4,500 m2, it has grown to the 594 exhibitors and 44,000 m2 of Optica '84.

The growth of the Fair, and its increasing importance as a world meeting place for the ophthalmic professions and industry is evident from the facts listed in the accompanying table.

Those interested in fashion spectacles rarely will have a comparable opportunity to revel in such a collection. The show provided a range from high fashion frames in metal and plastic, from fanciful designs in the most exotic colours, shapes and adornment imaginable to the simple old pear-shaped frames, resurrected and dressed in all colours.

But for the fashion conscious, frames were not the only items of interest. Eyeglass cases of every description, colour, shape and material added some glamour to the display. Even contact lens cases, although less in evidence, were more than just the plain plastic containers we know in North America. Jewelled boxes, and others made of leather and metal were to be found in certain specialty booths. Hung from an assortment of chains, cords and ribbons, they offered an almost limitless choice.

Many European practitioners still maintain product displays and a number of the exhibits dealt with tasteful ways to design eye-catching in-office displays. Interior decorators and office design consultants were also present to counsel and discuss office layout, furniture, frame bars and adjustment tables. These boutiques, perhaps surprisingly, were among the most patronised. It seems that Europeans do believe that an outwardly successful appearance breeds a successful practice.

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A practitioner could not help but be impressed by the wide selection and choice of frames. In metal or plastic, there were more than enough to meet a range of fitting requirements — from the fine featured person to the heavy set, full-faced individual, male or female. Too many collections, however, had only one bridge and one eye size, a factor which limits considerably the number of potential users or purchasers, particularly a careful practitioner who takes great pride in dispensing only well-fitted spectacles. Admittedly, economics do influence production decisions and the variety demanded by high fashion, or even more conventional designs, hardly permits a frame maker to build large inventories of multi-sized bridges and eye sizes. However, in cases of truly successful designs, consideration should be given to increasing the number of bridge and eye sizes on the second run of production.

The frames were beautiful in conception and design, and the lenses spoke high testimony to available technology. These standards could not have been reached were it not for the precision of the machinery used in their production. These displays, to an uninitiated person, layman or practitioner, must be an eye opener. All were automated and programmed by computers: surface grinders, lathes, polishers, eyewire formers for metal lenses, routers for plastic chassis and temples, stamping dies for metal parts, drills and milling machines. Only a complete tour through a frame and lens factory could be more comprehensive.

Hand tools, including all types of pliers for general and specific tasks, drew a considerable number of practitioners. Equipment for the small office lab or commercial laboratories included hand edgers, automatic edgers for glass or plastic, soldering machines for repairs, riveters and polishers.

Not to be overlooked either is the quality of workmanship revealed in the production of components for spectacles. It could not be achieved but for the excellence of machine tools used in their manufacture, whether it be for a simple hinge, to the fine precision machinery needed to fabricate spring hinges. Also overheard being discussed between salespeople and prospective buyers was the choice of metals and their alloys used for frames, and the variety of finishes applied. Even producers of sheet plastic for the fabrication of plastic frames were among the 594 exhibitors.

It was gratifying, and well in keeping with the slogan of the German Optometric Society Congress held concurrently — "Ways to optimum sight" — to see so much emphasis on spectacle lenses of both organic and mineral materials: single vision, bifocals and vocational lenses of all types. Spectacle therapy is more than just an attractive frame and a piece of glass or plastic. It consists of a comfortable and well-fitted frame able to satisfy the patient's cosmetic desires but, more importantly, incorporates a pair of lenses scientifically designed to meet that person's visual needs at home, at work and at play. *Lenses are to the optometrist what pharmaceuticals are to the physician.*

Although contact lens suppliers, distributors and manufacturers were well represented, they did not appear to be as proportionally numerous as at other fairs. Or perhaps it was just that their presence was more than matched by the great number of exhibitors of frames, lenses, material and production machinery.

Also on display at Optica '84 were aids for the visually handicapped, designed by regular ophtalmic firms as well as by the makers of telescopes and binoculars. Closed circuit televisions of various sizes, magnification and sophistication could also be seen in several booths. For practitioners interested in low vision, there were several examples of electronic readers in the exhibit. Various other non prescription and non optical aids, e.g. test cards, special equipment and trial sets were to be seen in only a few booths.

Several firms had large displays of tinted lenses in colours and intensities too numerous to list. Whether the tints were intended basically for cosmetic or psychological reasons, or to protect the eye from glare and infrared, it was not easy to ascertain. But there was a wide choice, including the "Corning RP" lens which I am informed was first researched by one of the European manufacturers and in which Professor Werner Adrian, now on the faculty at Waterloo, had a hand.

It remains a consistent source of surprise to this writer that at trade fairs and optometric congresses, optometric societies tolerate the display of blue lenses. In view of the fact that eye care practitioners both medical and optometric recommend protection from UV radiation, which blue lenses do not filter out, why use them and why display them?

Among glass and plastic makers for ophthalmic lenses were such firms as Corning, Hoya, Sola, VisionEase, Essilor and others. Such firms can contribute much to such fairs by making better known the types of materials they produce, their indices of refraction and transmission curves for radiation either within the visible spectrum or in the harmful range from low UV to infrared.

Last, but not least in this enumeration, was the display of diagnostic and refracting equipment and instruments. Every model in production was to be seen if one inquired: automatic refractometers, automated phoropters, biomicroscopes with or without camera attachments, fundus cameras, opthalmoscopes, retinoscopes. Lensometers and perimeters, from the standard hand operated models to the sophisticated digital and/or printout automated designs were everywhere, some linked to automated refractors. In fact, to this observer, optometric practitioners, appropriately, seemed much more interested in instrumentation than in frames.

If you are to believe the equipment exhibitors, the trend now is towards massive chairs and equipment stands, all automated to move at the punch of a button. Perhaps over-practically, this writer's first thought was that exam rooms will need to be larger to accommodate these models. On the other hand, there were numerous automated wall brackets on display, set up for narrow rooms. They might have been overlooked, but reverse projectors were not seen.

The Congress facilities in Cologne are superb. The exhibit hall, a huge place covering 44,000 square metres, was laid out with wide aisles to permit ease of movement, and to provide room for backdrops behind the booths. The kiosks themselves were beautiful. Tastefully designed, particularly those of the spectacle frame suppliers, some were so beautiful that they detracted from the frames themselves.

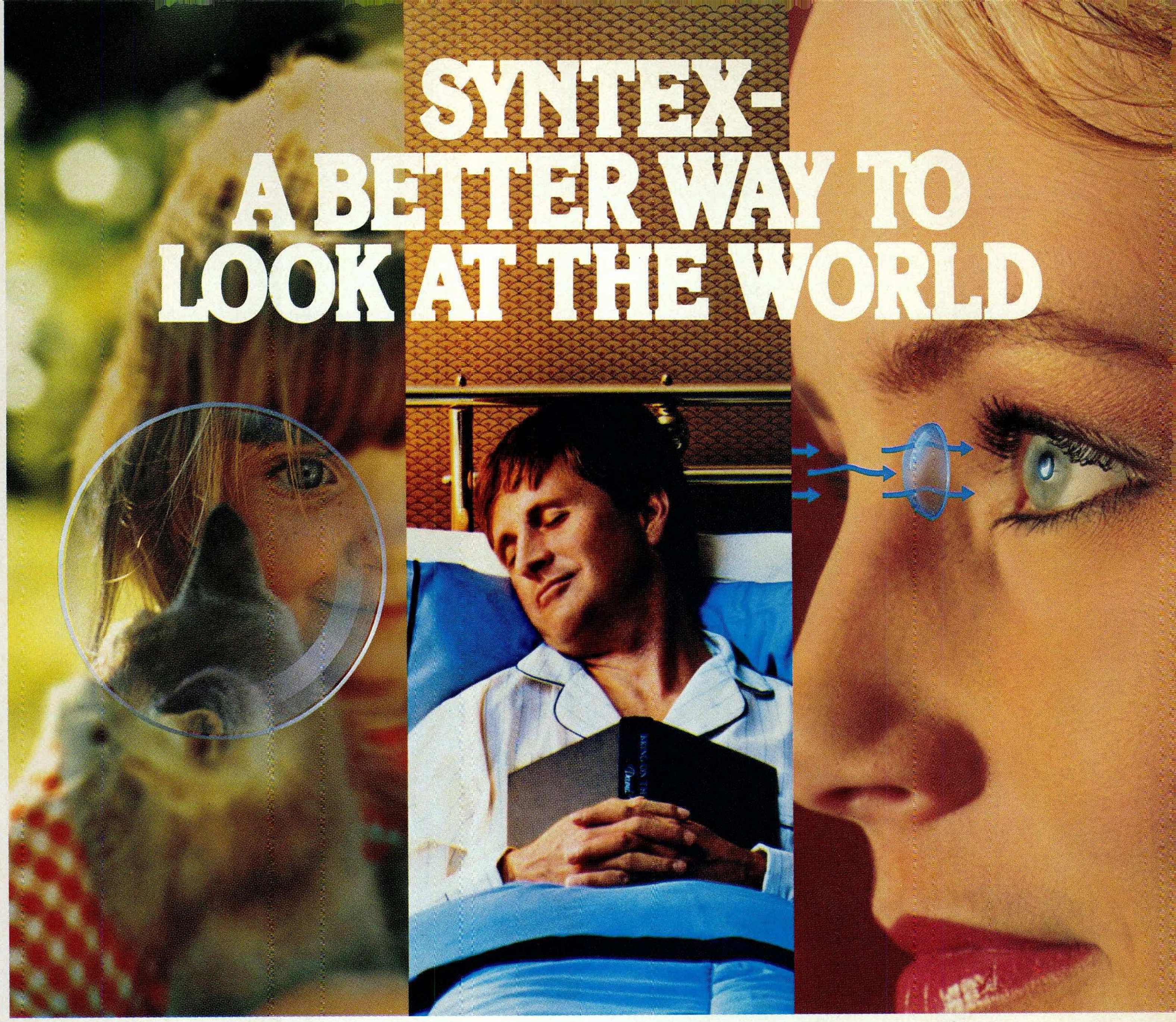
Two aspects seem to stand out as a general rule with European frame exhibitors. Open displays with quantities of frames are scarce. A few selected models are placed on wall panels, or in glass cabinets to attract the attention of passers by. But to offset this, most kiosks had two to four cubicles where salespeople equipped with the full range of that firms's collection may talk privately with buyers. Prospective buyers are required to sit and stay a while if they want to see the complete collection; a captive audience to some extent, but a good

marketing device. But the enforced stay is not a disagreeable one as all exhibitors serve coffee or other form of liquid refreshment.

Optometrist or dispenser, owner of a commercial processing laboratory, a frame manufacturer or a designer of ophthalmic precision machinery, Optica '84 could offer an answer to your needs from small hand tools to the largest pieces of equipment on display — the vacuum coating machines and electroplating baths.

The dates for Optica '86 have already been set for May 3-6, again in Cologne. Information can be provided by writing Köln Messe, Messe-und Ausstellungs-Ges.m.b.h. Köln, Messeplatz, Postfach 21 07 60, D-5000, Köln 21 (Deutz).

	Fed. Republic of Germany	Other Countries	Total
Number of Visitors	15,000	6,000	21,000
(Tickets Sold to Visitors from 72 Countries)			
Number of Exhibitors	261	200	461
(Direct Exhibitors from 25 Countries)			
Number of Exhibitors	28	105	133
(Represented Firms)			
Exhibition Space (m2)			
(Net Rented Stand Area)			17,478
(Gross Occupied Display Area)			44,000



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BOOK REVIEWS

Refraction and Clinical Optics. Aran Safir, ed. Harper & Row Publishers Inc., Hagerstown, Maryland, 1980 (565 pages, 528 illustrations) (no price stated)

When T.D. Duane's "Clinical Ophthalmology" made its debut in 1976, the publishers announced their intention to reproduce some individual sections from the mammoth five volume series to allow anyone with an extensive library to add only the best and most useful portions of the series. "Refraction and Clinical Optics", which constitutes a separate binding of Chapters 31 to 68 of Volume I, is the first such section to be available separately. The chapter arrangement and contents adhere closely to the course outline for the "Basic and Clinical Science" course of the American Academy of Ophthalmology and Otolaryngology. After a brief introduction to physical optics and intraocular scattering by David Miller there is a lengthy review of geometric optics by Christian L. Kuether. Throughout the text the editor has intentionally avoided a formal mathematical treatment of optics and has attempted to substitute a more graphic and descriptive presentation. This is an onerous task when attempting to describe Gaussian optical systems. The poor apposition between the text and pertinent figures does much to thwart this attempted simplification.

The eye itself is described firstly as a simple optical system and then as a clinical refractive entity. This background provides a basis for successive descriptions of a variety of objective and subjective refracting procedures including retinoscopy, subjective refraction, cycloplegic refraction, cross cylinder testing, keratometry, and automated refraction. The optical principles involved in various clinical examination procedures such as biomicroscopy, ophthalmoscopy, gonioscopy, fundus photography and laser interferometry are also clarified.

An earlier reviewer for the Canadian Journal of Ophthalmology (*Can J Ophthalmol* 16:162, 1981) suggested that Safir's book might be useful as a supplement for Rubin's "Optics for Clinicians" in the teaching of ophthalmology residents. This ophthalmological relevance of the material is perhaps best exemplified by the inclusion of a description of the optics of urine refractometry while at the same time excluding any optical consideration of lens aberrations. From an optometric perspective the text's mundane approach to refraction and optics is unnecessarily awkward and simplistic. In spite of the contribution of an impressive list of authors, many chapters seem outdated and poorly referenced. They have in fact been subsequently revised in Duane's parent publication. The various chapters dealing with contact lenses, automated refraction and intraocular lenses have all undergone major content revisions in the original loose leaf series since Safir's 1980 publication. Bearing this in mind, it would no longer seem reasonable to select "Refraction and Clinical Optics" for your library.

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Ocular Histology — A Text and Atlas (Second Edition) by Ben S. Fine and Myron Yanoff Harper & Row, Publishers, Inc., Hagerstown, 1979, pp 359, illus. U.S. $49.

Some years ago a board member told me that he liked to examine in ocular anatomy "because it never changes"; hopefully, today's graduates are spared this reactionary and uninformed attitude. Thanks to the introduction of transmission electron microscopy (TEM) into eye research coupled with developments in histochemical methods and later followed by scanning electron microscopy (SEM) and sophisticated autoradiographic and other tracing techniques, the body of knowledge of ocular anatomy has expanded dramatically over the past quarter of a century.

Since this book is an outgrowth of a section of a course in ophthalmic pathology presented at the U.S. Armed Forces Institute of Pathology, it is hardly surprising to find clinical observations in the form of external and fundus photographs, fluorescein angiograms and other examples of clinical relevence highlighting the anatomical observations. The bulk of the text leads the reader in a logical, even programmed, way from elementary microscopy to contemporary anatomical research at the time of publication. An introductory chapter describes the theory, techniques and interpretation of TEM and SEM in a manner readily intelligible to the non electron microscopist. Several chapters explain cytologic terminology and the classic concepts of membrane structure. Intracellular organelles and cytoplasmic inclusions are introduced with some indications as to their functions and examples of ocular structures when they are encountered.

Interrelations between cells are covered briefly and clearly. Consideration of extracellular materials such as collagen, mucinous materials and minerals leads naturally into basement membranes of the various types existing in the eye. Appropriate definitions, conventions and general descriptions are provided prior to the structure by structure description of the eye. Starting with the retina and proceding via the vitreous, lens, cornea and sclera, uveal tract, anterior chamber angle to the optic nerve and adnexa, each ocular tissue is considered from its embryonic origins through gross morphology to light histology and EM cytology. The whole book is liberally illustrated with light and electron (TEM and SEM) micrographs of outstanding quality, mainly from human material. These are enhanced by informative line diagrams and schematics. Standard metric purists will find the retention of the archaic units micron (/) and Angstrom (Å), rather than the recommended micrometre (/ m) and nanometre (nm), irritating. However, as with any five year old text it is possible to question minor points, concepts and terminology and these are far outweighed by the overall quality of the whole.

Eye care clinicians, students and educators will find that this book provides a good foundation for appreciating recent advances in our understanding of the pathological basis of a number of ocular conditions. Those whose anatomy ocular texts were/are limited to Spooner's "Ocular Anatomy", Wolffe's "Anatomy of the Eye and Orbit" or Volume II of Duke-Elder's "System" should be impressed and stimulated by "Ocular Histology". Unfortunately extraorbital structures other than the lids are not included and an up-to-date text including this information is needed and perhaps Gordon Ruskell's anxiously awaited book will fill this gap.

Anthony P. Cullen, M.Sc., O.D., Ph.D., F.B.C.O.
Professor of Optometry
University of Waterloo

The Canadian Optometric Education Trust Fund Invites Applications for Funding

under the awards schedule for the **1985 Grant Program**

Purpose of the COETF

Recognizing the need to support the continuing growth and development of the profession of Optometry, the COETF is prepared to financially assist the educational, research and manpower programs deemed by the Trustees to be more important to achieving these goals.

Suitably trained optometric manpower, and the profession's continued access to that manpower is vital to our academic evolution. *The COETF supports* faculty development in our schools of optometry, graduate students in specialized educational programs and investigative research by undergraduate students.

Ongoing research undertaken by the optometrist in private practice is just one type of professional development program which optometry must continue to initiate. *The COETF supports* projects established in a clinical environment to assist the visually handicapped and to assist other optometrists through preparation and publication of the details of these clinical research studies.

A third Canadian school of optometry is of vital concern to the profession. The ongoing activities of our two existing schools are just as important. *The COETF supports* needed alterations and renovations at both schools presently operating and stands ready to substantially assist in the operating cost support of a new school of optometry in Canada.

Continuing education in the 80s must be regular and structured as technology sweeps the profession forward into new methods and discoveries in the delivery of complete vision care. *The COETF supports* the development of an academic Chair of Physiological Optics and Continuing Education to meet these ongoing needs.

The Canadian Optometric Education Trust Fund invites your support in this "Vision of the Future". If you are (or know of) an optometric practitioner, student, educational institution, service organization or member of the general public who is presently involved in, or planning a program that meets any of the goals outlined above, then assistance might be available to achieve the project's objectives. Write to us, using the application in this issue of the CJO, by February 15, 1985. The Trustees assure that all projects meeting the purposes of the Fund will be given serious consideration.

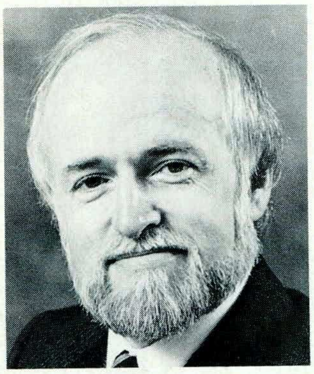
The COEFT supports!

VISION CARE NEWS

Canadian Association of Optometrists Elects New President

The Canadian Association of Optometrists is pleased to announce the election of Dartmouth, N.S. optometrist Dr. Ralph Rosere as national President for 1984 - 1985.

Dr. Rosere has represented the optometrists of Nova Scotia on the Association's National Council since 1979. In addition, he has served on the Executive of the Nova Scotia Association of Optometrists for a total of nine years — as Secretary-Treasurer from 1972-79, and as President for 1983-84.



Prior to obtaining his Doctor of Optometry in 1969 from the School of Optometry, University of Waterloo, Dr. Rosere graduated Dalhousie University with a B.Sc. in 1964 and a B.A. in 1965.

In addition to professional memberships in the Canadian Association of Optometrists, the Nova Scotia Association of Optometrists, the American Academy of Optometry and the American Optometric Association, Dr. Rosere is a past member of the Dartmouth Curling Club and the Burnside Athletic Club. He is presently active in the Atlantic Sports Car Club, Halifax Press Club and the Dartmouth YMCA.

Dr. Rosere maintains an active practice in Dartmouth, where he resides. He has two daughters — Tania, 19 and Roxanne, 14.

IOOL Report

CAO (then) President Dr. Roland des Groseilliers attended the 1984 General Delegates' Meeting of the International Optometric and Optical League in London, England, April 14-17, 1984.

As official Canadian delegate to the League, Dr. des Groseilliers was one of 45 delegates representing 28 national optometric organizations from 21 countries at this year's meeting, which focussed on

Dr. Albert Kever (l), League Delegate Emeritus, and CAO (then) President Dr. Roland des Groseilliers, Canadian Delegate, at the 1984 General Delegates' Meeting of the IOOL.

the status of the profession worldwide, and approved an administrative work schedule for the coming 12 months to be carried out under Executive Director Don Schaefer.

Among the plans for the League in the coming year is the development of a new computerised statistical program, and the improvement of communication between the League and its members.

"Frontiers of Optometry" Extend Across the Atlantic

North American optometry was well-represented at last April's IOOL Congress, held in conjunction with the 1984 Congress of the British College of Ophthalmic Opticians. Photographed at one of the Congress' gala social functions were (l-r) Dr. Gerard Beuglet, Windsor, Ontario; his wife, Marilyn; Mrs. Charna Mittelman; Dr. Joseph Mittelman, President, Ontario Association of Optometrists; Mrs. Barbara Kime; Dr. Roland des Groseilliers, Canadian IOOL delegate and (then) CAO President; Dr. Margaret des Groseilliers; Dr. Tim Kime, (then) President, American Optometric Association.

NBAO Executive Director

The New Brunswick Association of Optometrists is pleased to announce the appointment of Noëlla J. Lebrun as Executive Director of the Association.

Ms. Lebrun brings with her a wealth of professional association background including 11 years with the New Brunswick Teachers' Federation as, first, Secretary to the Director of Labour Relations and, later, Executive Assistant to the Executive Director of the Federation.

She is also a member of Professional Secretaries International, serving two years as President of the Eastern Canada Division, and has served as Interim President for the Fredericton Toastmasters Club. Most recently, Ms. Lebrun has expanded her professional memberships to include the Institute of Association Executives.

No stranger to optometry in the province, Ms. Lebrun has served as the NBAO's Secretary/Manager since September, 1982, assuming the Executive Director's post in April of this year.

VOSH International

Volunteer Optometric Services to Humanity (VOSH) International is a non-profit organization, founded in 1974 to provide vision and eye care to people in countries where this service either is not available, or is beyond their incomes.

VOSH members are primarily optometrists, although a number of auxiliary members are ophthalmologists, opticians,dispensers and family members.

On a "mission", all members pay their own expenses. Doctors and opticians provide at least 500 pairs of cleaned and labelled glasses.

A personal membership in VOSH International costs $15.00 (US). Newsletters are published quarterly, incidental bulletins more frequently. CAO members with an interest in VOSH are invited to contact the organization's Secretary-Treasurer, Dr. John Thayer Sr, P.O. Box 130, Belleville, KS, 66935, USA.

New Vision Foundation Down Under

A national foundation to enable the funding of vision research in Australia has been established.

The National Vision Research Foundation of Australia was established following discussions between The National Vision Research Institute of Australia, the Optometric Vision Research Foundation of New South Wales and the Vision Research Foundation of Australia. The NVRF will become the centre of a major fund-raising drive to set up funds for grants, scholarships and vision research projects in Australia.

Further information is available from:

John McNicol, Foundation Administrator
The National Vision Research Foundation
374 - 386 Cardigan Street
Carlton, Victoria 3053
Australia

Allergan Introduces Complete CL Cleaning System

Allergan has announced the addition of Oxysept™, a 30-minute complete peroxide system, to its line of contact lens products.

Oxysept™ is being promoted as a system for all soft contact lenses which cleans, disinfects and neutralizes in 30 minutes.

As an alternate, the company suggests the system can also be used to disinfect lenses overnight, but must then be neutralized the next morning for 10 minutes in Oxysept 2, whose neutralizer is a catalytic enzyme.

For further information:

Allergan Canada Ltd./Ltée.
c/o SMW Advertising Ltd.
240 Eglinton Avenue East
Toronto, Ont., M4P 1K8
(416) 486-7411

Allergan Offers Thimerosal Alternative — Sorbiclean®

Allergan has also announced the addition of a new daily contact lens cleaning solution to its line of products.

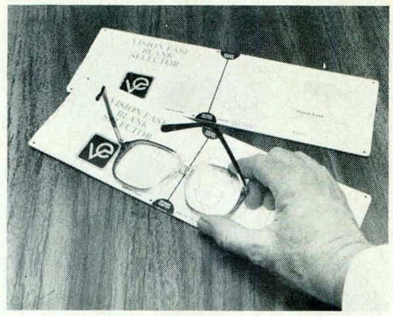
Sorbiclean® has been developed as an alternative daily cleaner for those wearers who demonstrate a sensitivity to thimerosal, CL solutions' most commonly used preservative. Sorbic acid is the preservative used in Sorbiclean®.

Further information is available from Allergan, c/o the agency address above.

Vision-Ease Blank Selectors

Lens blank selectors to help in the selection of correct plastic or glass lens sizes are available from Vision-Ease.

The blank selector is designed to assist in choosing the smallest possible lens that will fit the patient's frame and prescription. Complimentary



blank selectors are available from Vision-Ease Canada at the following address:

1625 Sismet Road Unit 16
Mississauga, Ont. L4W 1V6

Canadian Society of Aviation Optometry —Update

On June 26 this year, the interim executive of the Canadian Society received from CAO Council the go-ahead to begin procedures for formalizing the status of the Society as a CAO Section.

Rules and Regulations will be carefully considered and those optometrists who have expressed interest in the group will be forwarded the information when it is developed.

In the meantime, members with an interest in aviation vision, who have not already done so, are invited to forward your names to:

Lorne G. Hart, OD, FAAO
444 Beaconsfield Blvd.
Beaconsfield, Qué. H9W 4C1

Calendar

November, 1984
Alberta Optometric Association — Continuing Education
Annual Interdisciplinary Symposium
— Sports Vision —
Information: Gordon Hensel, O.D.
Chairman, Professional Services Enhancement Committee
c/o A.O.A.
The Professional Centre
#2 - 9333 - 50th Street
Edmonton, Alberta
(403) 468-1203

October 6-7
6th International Symposium on Contact Lenses
(l'Association des Optométristes du Québec)
Le Centre Sheraton Hotel, Montréal
Information: l'Association des Optométristes du Québec
465 St-Jean
Bureau 1003
Montréal, Québec
H2Y 2R6
(514) 849-8051

October 17-20
Insight in Sight
Canadian Conference on the Visually Impaired Child
(Program includes Dr. A.P. Cullen, School of Optometry, University of Waterloo)
Information: CNIB
350 East 36th Avenue
Vancouver, B.C.
V5W 1C6

October 19-21
7th Latin American Congress of Optometry and Optics
Lima, Peru
(Program includes a visit to the historic Macchu-Picchu ruins)
Information: Dr. E.J. Fisher
c/o School of Optometry
University of Waterloo
Waterloo, Ontario
N2L 3G1

November 8-11
European Society of Optometry
18th Scientific Congress
Jerusalem Hilton, Israel
Information: Dr. Harvey Rosenwasser, O.D., F.A.A.O.
1518 Walnut Street
Merlin Tower, Suite 1401
Philadelphia, PA
19102, U.S.A.
or C.A.O.

1985
March 31 - April 8
5th Asian Pacific Optometric Congress
Rasa Sayang Hotel/Batu Ferringi Beach
Penang, Malaysia
Information: Dr. Damien P. Smith
Secretary-General
International Federation of Asian and Pacific Associations of Optometrists
7 Cookson Street
Camberwell 3124
Australia
or C.A.O.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Prescription Lenses Zeiss lenses are finished to unsurpassed standards of excellence.
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Frames Elegantly styled frames to suit to-day's fashions and tastes.
Prescription Sunglasses World-famous Umbra Punktal lenses for maximum protection across the entire visible spectrum.
Safety Eyewear A comprehensive program of Titmus safety eyewear.
Spectacle Cases Prestige and limited-edition quality cases.
Low Vision Aids Monocular and binocular low vision aids, covering a wide range of viewing conditions.
Eye Care Equipment A full range of instruments and equipment for the eye care professional: slit lamps; objective refractors; subjective refractors; chairs and stools; keratometers; lensometers; field testing equipment; automated diagnostic centres; contact lens fitting centres; surgical microscopes.
Office Design Design and construction of complete professional offices and optical displays.
ZEISS
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Carl Zeiss Canada Ltd/Ltée (416) 449-4660

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OXYSEPT.

NOW SOFT CONTACT LENSES CAN BE AS SIMPLE TO CARE FOR AS THEY ARE TO WEAR.