بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

STUDY OF THE MAJOR ELEMENTAL CONSTITUENTS AND ULTRASTRUCTURE OF AVIAN EGGSHELL ADOPTING LASER AND SEM TECHNIQUES

By

ZIENAB ABDEL-FATTAH ABDEL-SALAM

Thesis

Submitted in partial fulfillment of
the requirements for the degree of
Master of Laser Science

Department of Environmental, Photohcemical &Agricultural Applications

National Institute of LaserEnhanced Sciences (NILES)

Cairo University

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SUPERVISION COMMITTEE

TITLE: STUDY OF THE MAJOR ELEMENTAL CONSTITUENTS AND ULTRASTRUCTURE OF AVIAN EGGSHELL ADOPTING LASER AND SEM TECHNIQUES

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ABSTRACT

The avian eggshell is composite structure of calcium carbonate in association with organic components. Calcium, magnesium, and sodium are major inorganic constituents of the avian eggshell. However, Ca distribution is not homogenous throughout the shell thickness, its relative concentration increases from inside to outside. This phenomenon is more pronounced after hatching indicating the consumption of the inner layer contents by the embryo during its development. On the other hand Mg and Na concentrations in the internal layers of the eggshell before hatching are higher than after hatching for the same reasoning. It has been suggested that an increase in magnesium content of the shell is directly related to an increase in shell hardness. In the present work Laser Induced Breakdown Spectroscopy (LIBS) technique has been used to study the avian eggshell elemental composition before and after hatching. Depth profiling of the shell is also carried out to follow-up different elements throughout the shell thickness using the same laser spectroscopic technique. The evaluation of the LIBS spectra of the examined samples provided us with qualitative information about the consumption of different elements during incubation. Scanning electron microscopy was also used to assess the relationship between layers of the eggshell before and after hatching. The thicknesses of the mammillary, palisade, vertical crystal, and cuticle layers relative to the total eggshell thickness were measured before and after hatching. The percent contribution of the layers was different in the thinnest and thickest eggshell after and before hatching respectively. To confirm the previous results concerning the distribution of calcium through the shell thickness energy Dispersive X-ray Spectroscopy (EDS) has been used. In addition preliminary

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results have been obtained in a study of the effect of laser exposure of avian eggs prior incubation on the hatchability.

The milestone of the present thesis is to explore the possibility of harnessing new technological tools such as LIBS in poultry science. Of great interest is performing in *situ* studies in incubation centers for quality control and improvement of the productivity.

Alaa Abdou

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