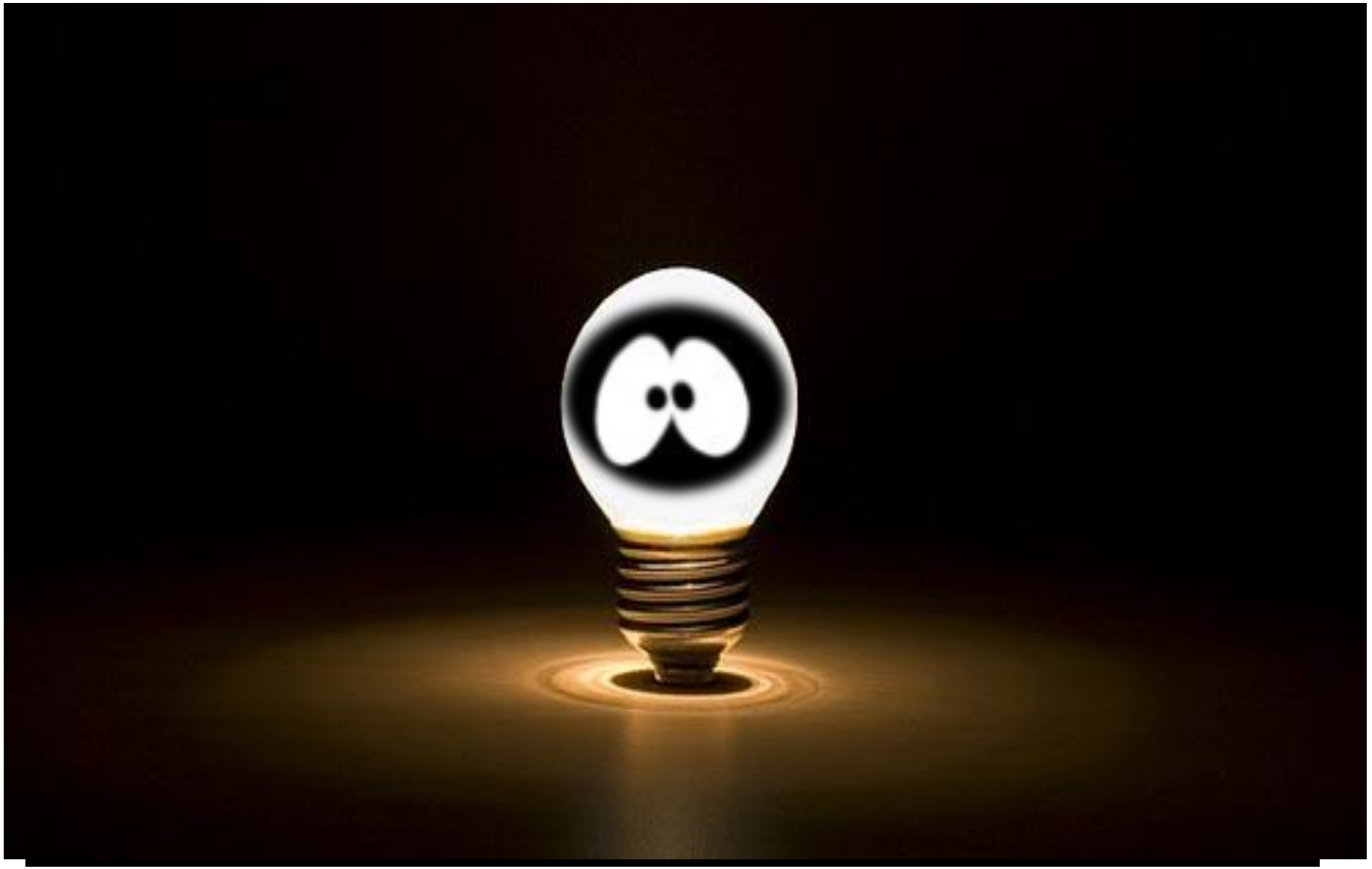
It wasn't my dog, it wasn't my dog's fault, it's not my dog's DNA the science is wrong!

George Sofronidis BSc (Hons)
Managing Director – Orivet Genetic Pet Care

Orivet Genetic Pet Care

What is the Best Way to Get Started?



Sourcing DNA Information

What do we hope you get out of the Worskhop?

Dog Attacks =Various Approaches = Various Collection Procedures

I don't get it, it's all too hard. I wouldn't know where to start. "Just stick everything a bag and send."

I've got the kit. I've watched CSI and I sought of know what to do.

It all makes sense and such a simple process!

What Tools do You Need?

Law Enforcement

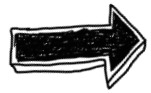
Police
Councils (Local Laws)
Veterinarians

Collect Evidence
Assess the Scene
Chain of Custody

Science

Laboratory
Tests – Accreditation
Technology

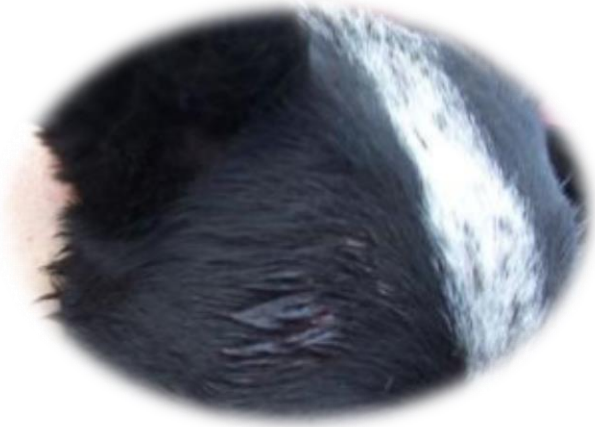
Sign off on samples
Run through
Turnaround Times



Legal Issues

Sign off on samples
Run through

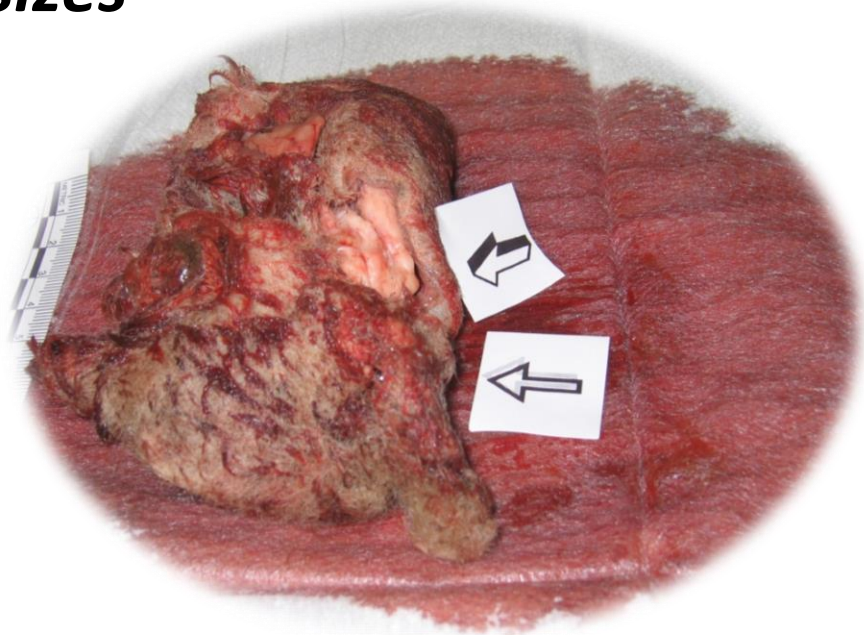
What to look for and what is the process for collection?



Every case is different, every client is different and every emotion is different!

All shapes

All sizes



All requests

I have QUESTION?

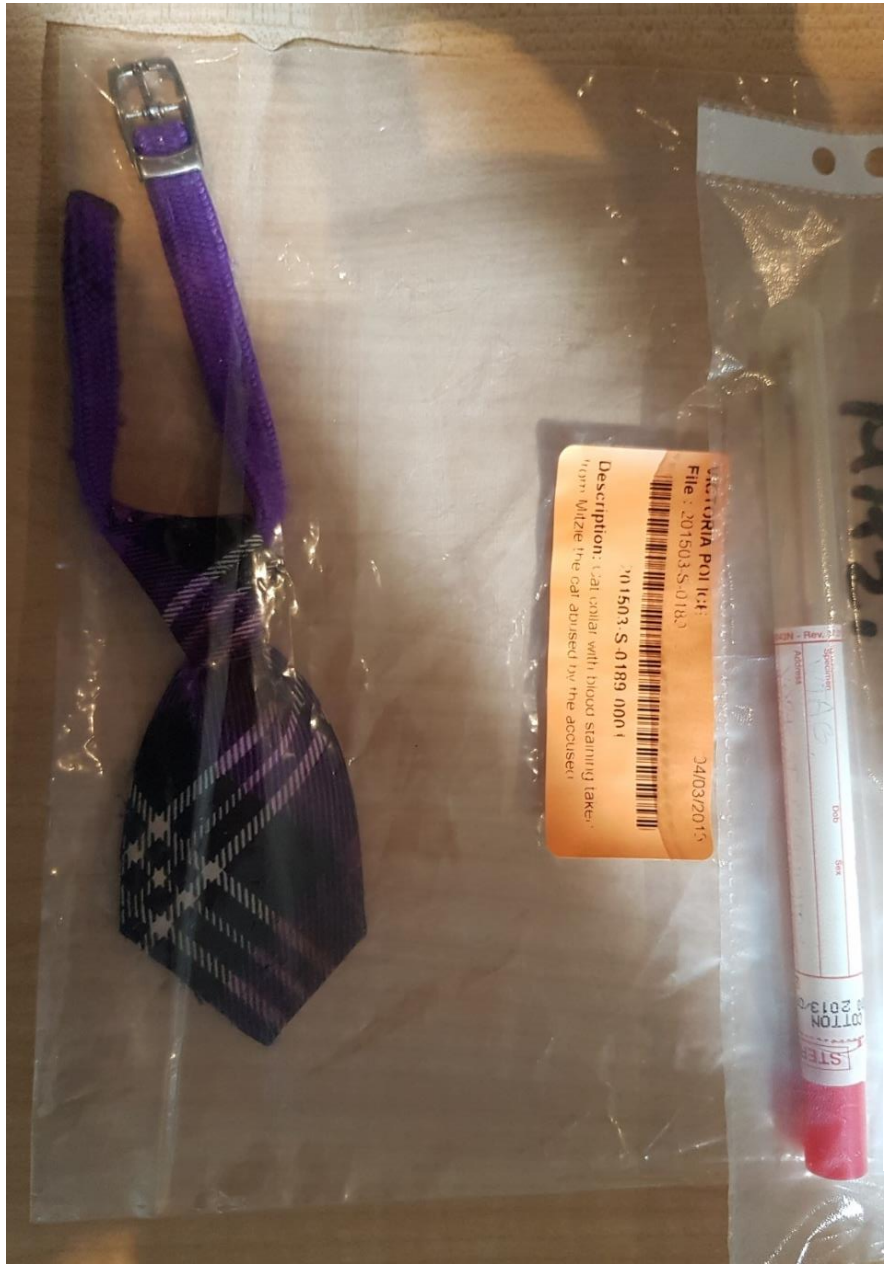
My cat's gone missing

Owner thinks their cat has been found as "road kill"

Hi
Sorry to hear about the failed sample. I understand these things can occur. I was quite sure that I had taken an adequate sample.
The puppy is extremely aggressive and we still managed to get the swab in the mouth for 15 seconds while he had a muzzle.

I had originally taken a blood sample for a Sydney based lab but they then said we could not ship blood over from NZ due to Quarantine restrictions.
Is it necessary to take a swab or can blood be used?

Previous Case No:
Clinical Particulars Hens killed by dog.
Need proof that saliva on swabs matches saliva on feathers on wound edges. NOT NECESSARY TO FIND SALIVA ON EACH OF THE BIRDS, ONE IS ENOUGH
Panel Breakdown on Reverse*



Orivet Genetic Pet Care

2. Evidence Sample Collection

Case #

Received

To be completed by sample collector.

Complete this section for animal DNA evidence collected at the scene that you will be submitting for DNA analysis.
Please individually bag and seal all samples.

Sample Collector's Details

Name	Company	
Professional Address		Telephone

Sample Details

Address of where sample was taken

Relevant Physical or Geographic Features of Note

(e.g. Sample taken from left corner of park near broken fence line)

☐ Hair ☐ Blood ☐ Swab ☐ Clothing	Number of samples taken:	Other:

Brief sample description (if applicable)

Declaration

I, *(insert name)*	collected the sample(s) specified above and completed the label. The samples were then placed in the bag and sealed.
(Signature of collector completing declaration)	Date

Chain of Custody

Please ensure that each Evidence sample is in separate sealed bags and are clearly labelled.

Samples that have been sealed and labelled are to be sent to Orivet Genetic Pet Care at the address on top of the page.

Sample sent to Orivet via Courier

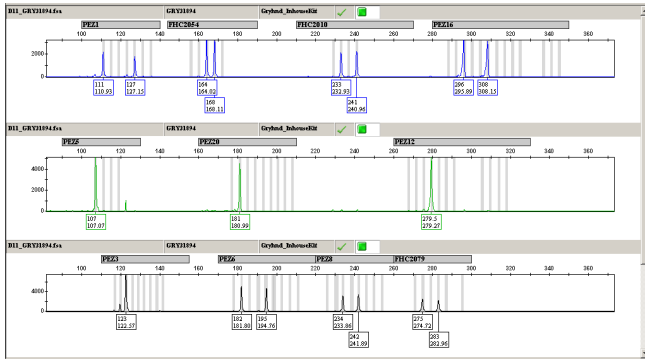
Carrier	Consignment number
Sent by	Date of dispatch

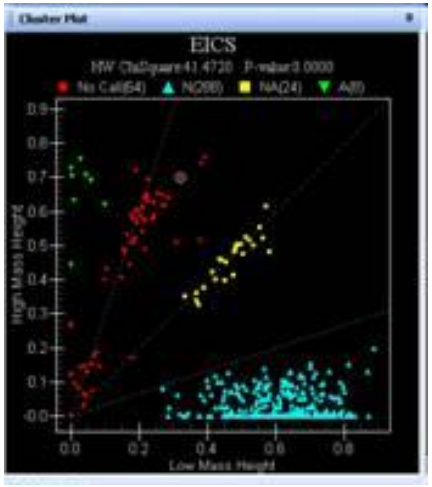
Sample Hand Delivered

Delivered by		Of
Date	Time	Received by

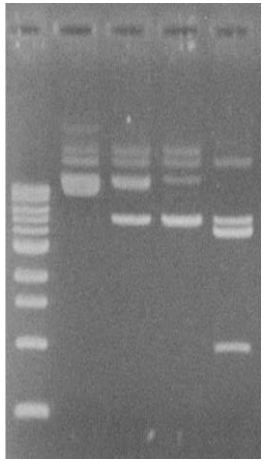
Extraction

Analysis

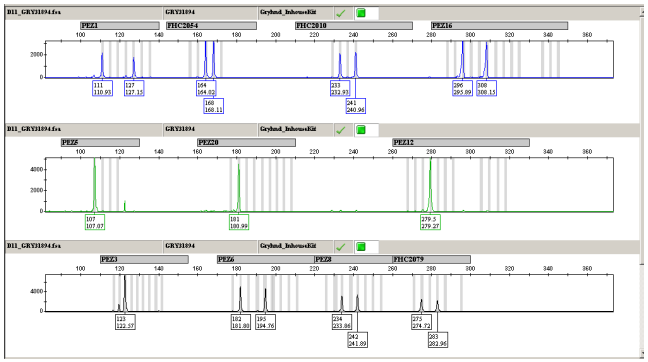


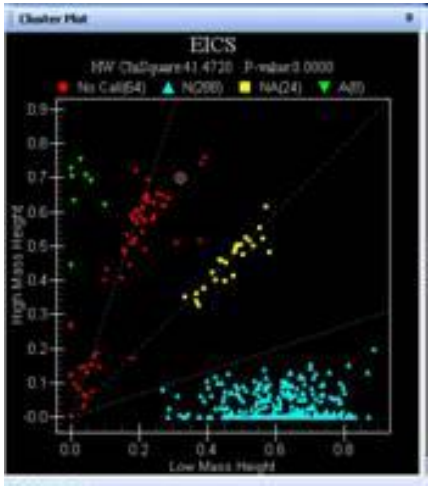


Quantity – How Much Do we Have?



Amplification

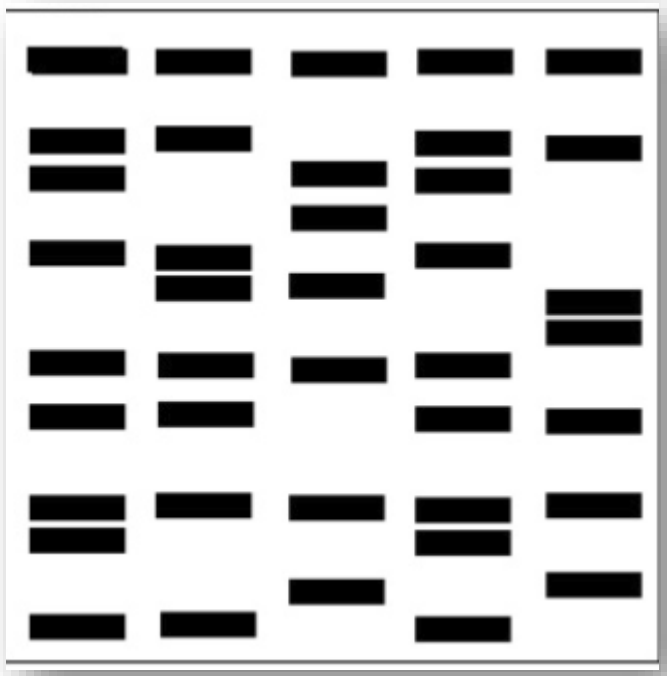




Set of numbers (size of the DNA) molecular weight or a set of letters (DNA code) G, A, T or C

DNA fingerprint = DNA profile = genetic profile

R



DNA PROFILE The DNA Profile below represents the genetic identification of Charlie

P1_2	A	A	P3_2	A	A	P3_3	G	G	P11_3	C	C	P12_1	A	G	P24_2	A	A	P12_3	G	G	P30_3	A	T
P13_1	A	C	P24_3	A	A	P31_1	A	A	P28_3	T	T	P31_3	A	G	P25_1	G	G	P32_2	G	G	P13_2	A	A
P13_3	C	C	P25_2	A	A	P25_3	C	C	P32_3	G	G	P33_1	G	G	P14_1	T	T	P10_1	G	G	P26_1	A	G
P33_3	G	G	P26_2	A	A	P14_2	C	G	P26_3	G	G	P14_3	C	C	P15_1	A	A	P34_1	A	C	P34_2	A	G
P34_3	A	C	P10_3	A	C	P15_2	G	G	P15_3	A	A	P16_3	C	G	P35_1	G	G	P35_2	G	G	P36_1	A	C
P17_1	G	G	P36_2	C	C	P37_2	G	G	P17_2	A	A	P29_1	C	G	P37_3	A	G	P38_1	C	C	P38_2	G	G
P27_1	C	G	P17_3	A	A	P27_2	A	A	P4_3	A	G	P18_2	C	C	P18_3	C	C	P5_1	G	G	P11_1	G	G
P19_1	T	T	P19_2	A	G	P5_2	G	G	P19_3	G	G	P2_1	G	G	P2_3	C	C	P27_3	A	T	P20_1	A	G
P20_3	A	A	P5_3	G	G	P11_2	C	C	P6_2	A	G	P6_3	C	C	P21_1	A	G	P21_3	G	G	P22_2	A	C
P28_1	A	G	P7_1	C	C	P7_2	A	A	P28_2	C	C	P7_3	A	A	P29_2	G	G	P8_1	A	A	P22_3	G	G
P8_2	G	G	P8_3	A	G	P23_1	C	C	P9_3	A	T	P23_2	C	C	P23_3	A	A	P24_1	A	A	P3_1	G	G

"set of genetic values unique to that individual, inherited from each parent"

DNA PROFILE The DNA Profile below represents the genetic identification of Raggedy Anne

CHRA1.147652232	G	G	CHRA1.161489899	A	A	CHRA1.182274661	A	G	CHRA1.203180122	A	G	CHRA1.225272697	G	G	CHRA1.254445788	A	G	CHRA1.277751565	A	G			
CHRA1.35096216	A	G	CHRA1.66285706	A	G	CHRA1.8645803	G	G	CHRA1.90886901	C	C	CHRA2.105639377	A	A	CHRA2.127940273	A	G	CHRA2.14510517	A	A			
CHRA2.171182940	C	C	CHRA2.177549293	A	A	CHRA2.21472877	A	A	CHRA2.217930062	A	G	CHRA2.33979426	A	G	CHRA2.65750322	A	A	CHRA2.96523276	A	A			
CHRA3.117471748	A	A	CHRA3.139708979	A	A	CHRA3.15528070	A	G	CHRA3.28113236	G	G	CHRA3.2835846	A	A	CHRA3.35789415	A	G	CHRA3.98497082	A	G			
CHRB1.100153958	A	A	CHRB1.13362	G	G	CHRB1.137984657	G	G	CHRB1.15122664	A	C	CHRB1.161403614	A	G	CHRB1.194730318	A	A	CHRB1.213211080	A	A			
CHRB1.29329084	A	G	CHRB1.56679059	A	A	CHRB1.69970470	A	G	CHRB2.112725014	A	A	CHRB2.127806414	A	G	CHRB2.144270294	A	A	CHRB2.159161793	A	G			
CHRB2.39410270	A	A	CHRB2.44526758	G	G	CHRB3.103519744	G	G	CHRB3.108594864	G	G	CHRB3.129823001	G	G	CHRB3.143855324	G	G	CHRB3.15158039	A	G			
CHRB3.44006038	G	G	CHRB3.69408089	A	G	CHRB4.112927129	A	G	CHRB4.129718002	A	G	CHRB4.156816042	A	A	CHRB4.27583384	A	G	CHRB4.6940122	G	G			
CHRB4.77313232	G	G	CHRB4.93595346	G	G	CHRC1.132987869	A	G	CHRC1.156688949	A	A	CHRC1.170053490	A	G	CHRC1.199526609	A	A	CHRC1.211548622	G	G			
CHRC1.227709958	G	G	CHRC1.35353868	A	G	CHRC1.45295530	A	A	CHRC1.56297389	A	G	CHRC1.76501424	A	A	CHRC2.13376232	A	C	CHRC2.140853350	A	G			
CHRC2.153875641	A	A	CHRC2.2254710	A	A	CHRC2.32881044	G	G	CHRC2.68311280	A	C	CHRC2.81863545	G	G	CHRD1.122896648	G	G	CHRD1.155108396	G	G			
CHRD1.17333694	A	A	CHRD1.31840413	A	A	CHRD1.4801928	A	G	CHRD1.96334367	G	G	CHRD2.3920915	A	G	CHRD2.63390925	A	G	CHRD2.70137294	G	G			
CHRD2.82255010	A	A	CHRD2.93650111	A	C	CHRD3.1874324	A	A	CHRD3.25103574	A	G	CHRD3.60188001	A	G	CHRD3.86169540	A	A	CHRD4.13485526	G	G			
CHRD4.36752454	A	A	CHRD4.42413266	A	A	CHRD4.52346148	C	C	CHRD4.98825532	G	G	CHRE1.40338965	A	G	CHRE1.69446066	A	A	CHRE1.7439176	A	A			
CHRE2.13480422	C	C	CHRE2.33619241	A	G	CHRE2.72592582	A	G	CHRE3.15324152	A	G	CHRE3.35126702	A	A	CHRE3.68341106	A	A	CHRF1.2018000	A	G			
CHRF1.24753896	A	A	CHRF1.35115194	A	G	CHRF1.60720527	A	G	CHRF2.11898988	A	G	CHRF2.20222767	A	G	CHRF2.29161378	G	G	CHRF2.47823420	A	A			
CHRF2.67965848	G	G	CHRF2.73327273	A	A	CHRX.109143347	A	G	CHRX.157577155	C	C	CHRX.49536490	C	C	CHRX.5996958	A	G						

P1_2 A G P28_3 A T P10_1 G G P10_3 C C P29_1 G C P11_1 C C P11_2 G G P29_2 G G
P3_1 G G P3_2 C A P3_3 P11_3 G G P12_1 G G P24_2 A A P12_3 C C P30_3 T A
P13_1 P24_3 T T P31_1 T T P31_3 C C P25_1 C C P32_2 G G P13_2 T T P13_3 C A
P25_2 A G P25_3 G G P32_3 A G P33_1 G G P14_1 A A P26_1 A A P33_3 C C P26_2 A A
P14_2 C G P26_3 C C P14_3 C C P15_1 G A P34_1 G T P34_2 T T P34_3 G G P15_2 T T
P15_3 G G P16_3 C G P35_1 C C P35_2 G G P36_1 A A P17_1 G G P36_2 C C P37_2 T C
P17_2 A A P37_3 A A P38_1 G G P38_2 C C P27_1 G G P17_3 C C P27_2 T T P4_3 T T
P18_2 C C P18_3 G T P5_1 C C P19_1 T T P19_2 G G P5_2 C C P19_3 C C P2_1 G G
P2_3 G T P27_3 T T P20_1 A A P20_3 T T P5_3 C C P6_2 T C P6_3 G G P21_1 G G
P21_3 C C P22_2 C C P28_1 C C P7_1 G T P7_2 T T P28_2 P7_3 T T P8_1 G G
P22_3 P8_2 C C P8_3 T T P23_1 C C P9_3 T A P23_2 P23_3 A A P24_1 G G

P1_2 P28_3 P10_1 G G P10_3 C C P29_1 C C P11_1 P11_2 G G
P29_2 G A P3_1 P3_2 P3_3 P11_3 G G P12_1 P24_2
P12_3 P30_3 T T P13_1 C A P24_3 P31_1 P31_3 C C P25_1 C C
P32_2 C G P13_2 T T P13_3 P25_2 P25_3 P32_3 A G P33_1 G G
P14_1 A A P26_1 A A P33_3 C C P26_2 A A P14_2 C C P26_3 C C P14_3 C C
P15_1 A A P34_1 G G P34_2 T C P34_3 T T P15_2 C T P15_3 G T P16_3 C G
P35_1 P35_2 G G P36_1 A A P17_1 P36_2 C C P37_2 P17_2 C A
P37_3 A G P38_1 G G P38_2 T C P27_1 P17_3 T T P27_2 G T P4_3
P18_2 C A P18_3 G G P5_1 C C P19_1 T T P19_2 G G P5_2 C C P19_3
P2_1 P2_3 G G P27_3 P20_1 G A P20_3 T T P5_3 C C P6_2 C C
P6_3 G T P21_1 G G P21_3 P22_2 P28_1 T C P7_1 G G P7_2 C T
P28_2 P7_3 P8_1 A A P22_3 G G P8_2 P8_3 C T P23_1 C C
P9_3 P23_2 C C P23_3 P24_1 G G

Partial DNA Profiles

Quantity and Quality of DNA

Dropout of markers (SNPs) – blank spaces

DNA Testing – Why Do It?

DNA is interrogated

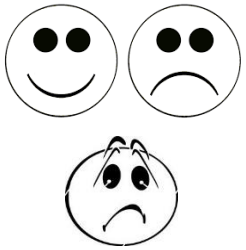
Practical
(Effective means)

DNA Profiling/individual Identification

Forensics

Paternity – Dam and Sire verification

Disease diagnosis
prevention/risk
Prenatal diagnosis



Social
Direct to consumer

Ancestry

Fun tests – not health related
"aspects of life"

Traits?

Parentage Tool

Under Construction

DAM & SIRE CONFIRMATION | SINGLE PARENT CONFIRMATION | FORENSIC TOOL

Please select animal barcodes from dropdown menu. You can only select animals listed in your account and any shared animals.

Examination Sample

17136237

Reference Sample

17142041

RUN ALGORITHM

DOWNLOAD PDF

Final Result : CANNOT BE EXCLUDED

```
CANNOT BE EXCLUDED
```

Exclusions :

```
[]
```

Inconclusive :

```
["snp01","snp11","snp13","snp15","snp19","snp20","snp24","snp26",
"snp37","snp60","snp78"]
```

UPDATE FINAL RESULT

Inclusions are up to 99.9998% depending on breed(s), number of markers and samples submitted.

Percentage Summary

Match Percentage : 87.5 % [77]

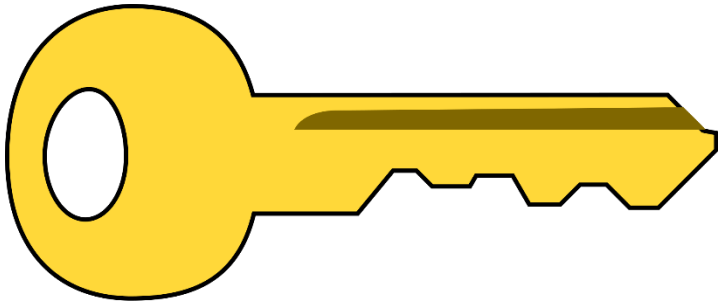
Exclusion Percentage :0 % [0]

DropOuts Percentage :12.5 % [11]

Exclusions = No Match = 100%

Used to incriminate or exonerate!

success	snp02	AA	AA
success	snp03	GA	GA
success	snp04	CC	CA
success	snp05	CC	CC
success	snp06	CC	CT
success	snp07	GC	GG
success	snp08	GG	GG
success	snp09	GG	GG
success	snp10	CC	CA
warning	snp11		GG
success	snp12	GG	GG
warning	snp13		GG
success	snp14	GG	GG
warning	snp15		CC
success	snp16	TT	TT
success	snp17	CC	CC
success	snp18	TT	GT
warning	snp19		TT
warning	snp20		CC
success	snp21	TC	TT
success	snp22	GG	GG



What is a Reference Sample?

Origin is known!

Collection Process

Can be collected at any time

Can be more than one sample

Are you qualified to collect?

Orivet Genetic Pet Care

1. Reference Sample Collection

To be completed by sample collector.

Case #

Received

Complete this section when taking a sample from an animal that is suspected of being involved in the incident.
This reference sample will be compared to the sample(s) taken from the scene.
You can collect more than one reference sample. Reference sample can be collected anytime after the incident.

Animal's Details

Name	☐ Male ☐ Female ☐ Desexed	Breed/Suspected Breed *(please complete only if known)*
COLOUR		MICROCHIP # *(must be cited/scanned)*

Owner's Details (if known)

Name
Address

Reference Sample Type (must use laboratory approved procedure)

☐ Swab ☐ Blood (EDTA) ☐ Other

Declaration (collector)

I, *(insert name of collector)*	
of *(insert professional address/or same)*	
took the sample specified at *(insert time)*	am/pm on *(date)*
at *(insert place of collection)*	
I took the sample specified above and completed the label. The samples were then placed in their own bag and sealed.	
(Signature of collector completing declaration)	Date

Chain of Custody

Please ensure that each Reference sample is in separate sealed bags and are clearly labelled.

Samples that have been sealed and labelled are to be sent to Orivet Genetic Pet Care at the address on top of the page.

Sample sent to Orivet via Courier

Carrier	Consignment number
Sent by	Date of dispatch

Sample Hand Delivered

Delivered by	Of

The Collection Process – PINCH, SWIRL and DRY!

Ensure that you pinch the cheek well around the nylon brush.

Using your fingers to keep the cheek pinched, swirl the nylon brush around the pinched cheek for a good 6-10 secs.

Do I need to wear gloves?

Positive ID – You MUST cite the number – scan and read and check

Take your time and SCAN from top to bottom

What do you do if you try and try and still cannot find the chip?

Record and note – **"chip could not be found (scanned)"** next to the chip number

GENETIC ANALYSIS SINGLE REPORT

Orivet Genetic Pet Care
e labresults@orivet.com
p +61 3 9534 1544
www.orivet.com

OWNER'S DETAILS

George Sofronidis
C/O Orivet Genetic Pet Care
St Kilda
Victoria 3182 AU

ANIMAL'S DETAILS

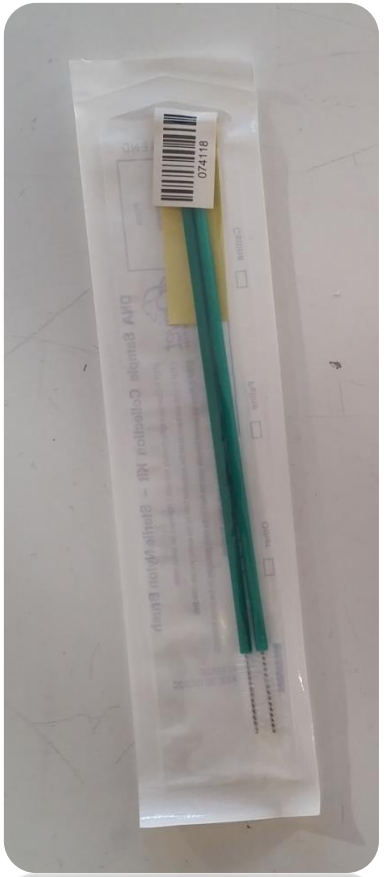
Registered Name:	Bangers and Mash	**Pet Name:**	Snagz
Registration Number:	2190705842	**Breed:**	Dachshund
Microchip Number:	956008001058738	**Sex:**	Intact Male
Date of Birth:	10/2/2014	**Colour:**	Brown

COLLECTION DETAILS

Case Number:	17157148	**Date of Test:**	18/08/2017
Approved Collection Method:	YES	**Collected By:**	Jane Smith

Scanned and cited

Any vet and/or "trained" officer



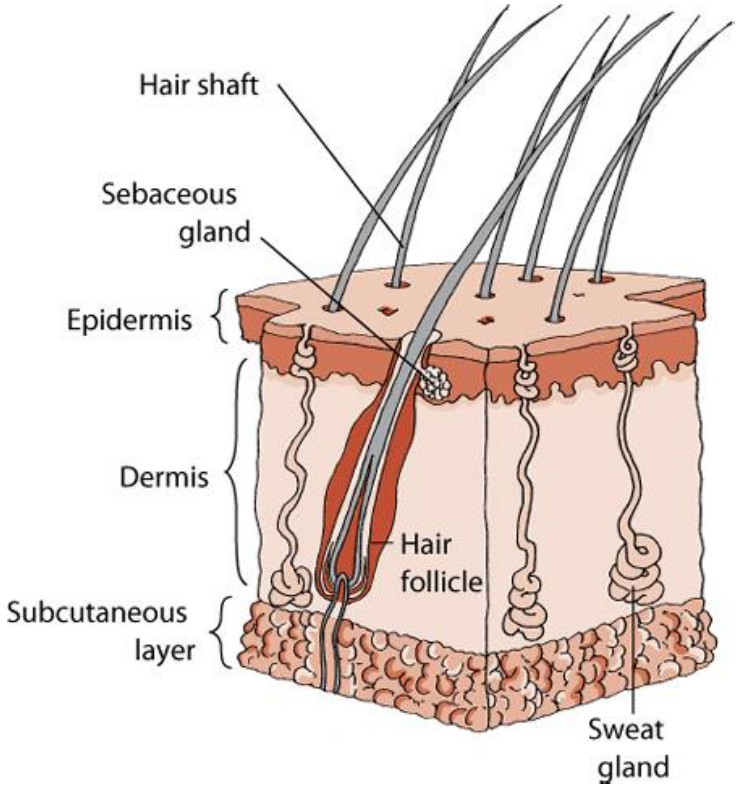
VS

VS

Nylon Brushes
or
Cotton Swabs

EDTA Blood Tube
0.5ml

Blood or Semen
Spotting Cards



Mitochondrial dna (mt dna) vs nuclear DNA (genomic)

Mitochondrial DNA only has one chromosome, and this is organized like a circular genome (similar to most prokaryotic DNA). This single chromosome is much shorter, and codes for the specific proteins which are used in the metabolic processes

Nuclear DNA is the standard 46 chromosomes which you've heard about, where you inherit 23 from your mom and 23 from your dad. These are very long, with centromeres and telomeres

*mtDNA, since it is solely **matrilineal,** doesn't undergo recombination like nuclear DNA--meaning that while nuclear DNA is a shuffle of your parents' DNA, all changes in mtDNA have to come from mutations. Thus, mtDNA is great for trying to detect human ancestry.*

You have a cat attacked by what you believe are **two dogs (neighbour)** and **dog roaming** the street. You submit and have collected a wet swab from a number of wounds near the cat. A hair sample (matted) from the cat and a "wet swab" taken from the neighbour's dog.

Q: What reference samples do you need to collect?

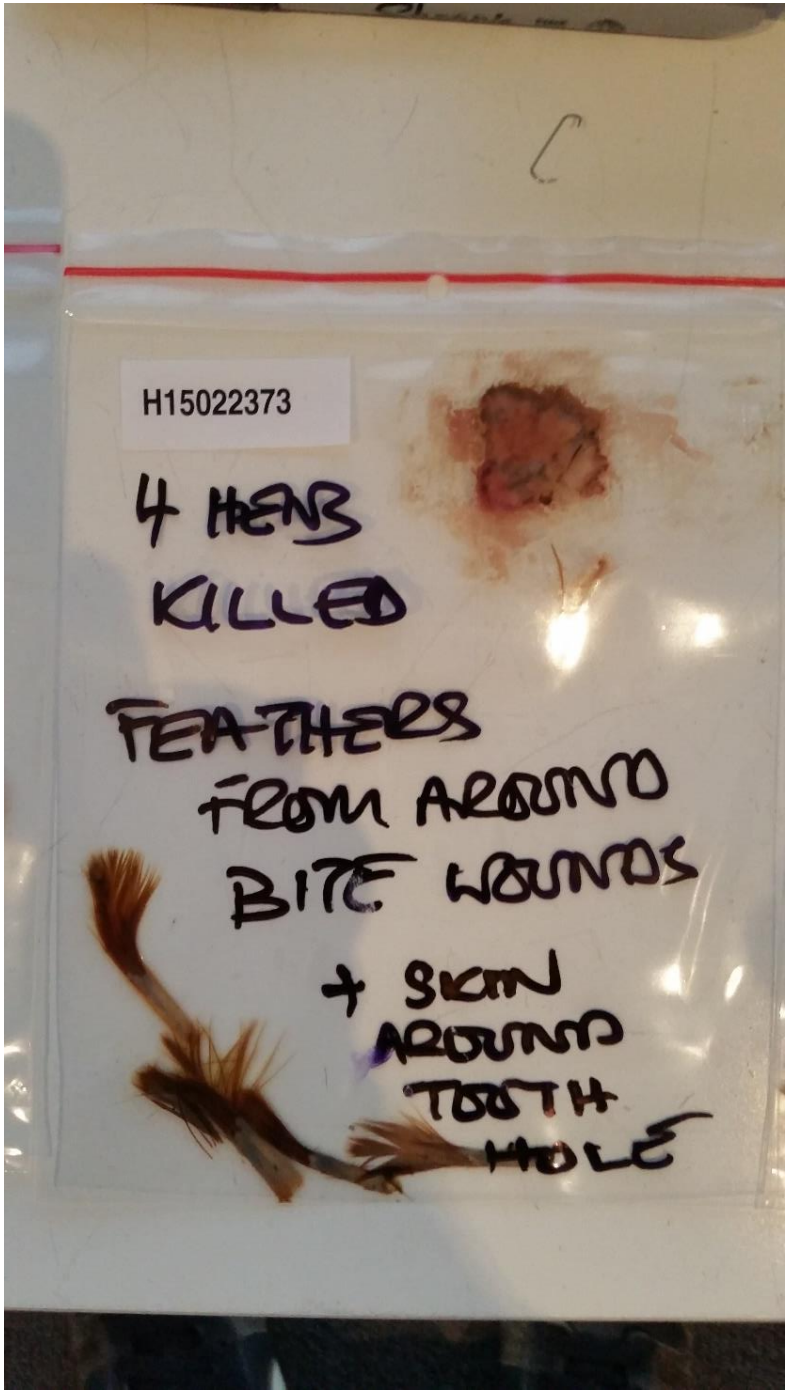
You are contacted by a farmer whose chickens have been mauled by what they think is a dog or fox or wild animal.

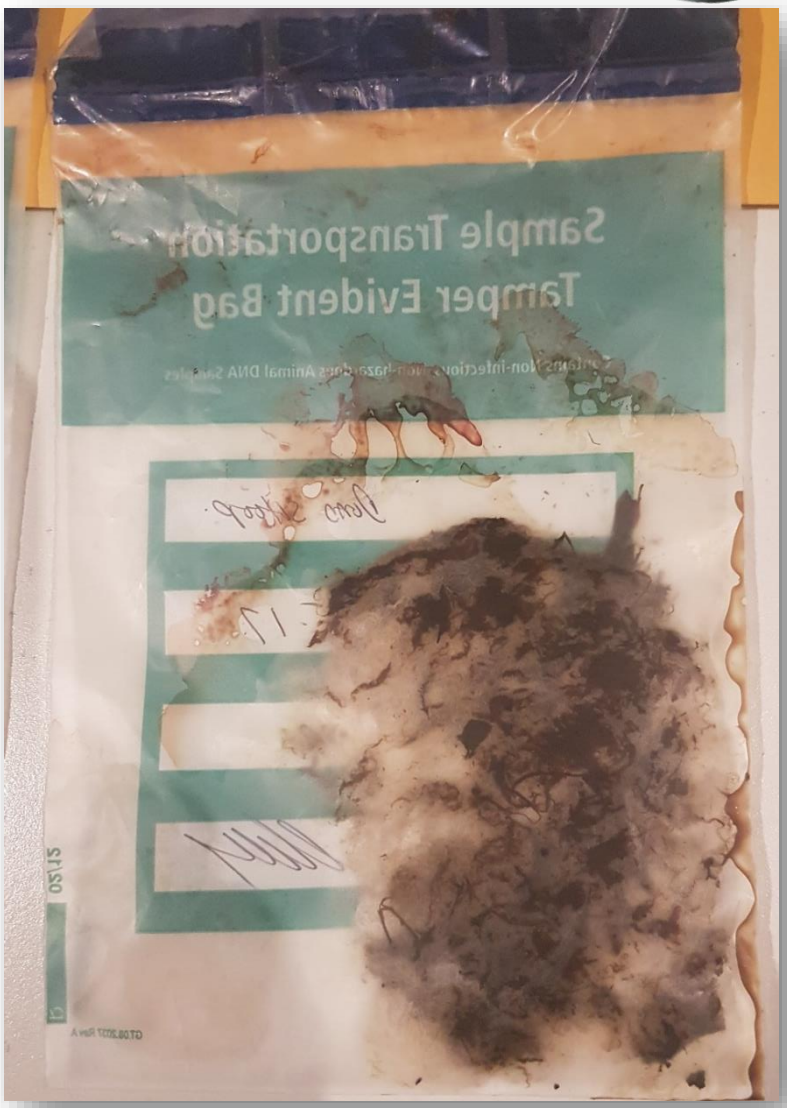
Q: What samples should you try and look for?

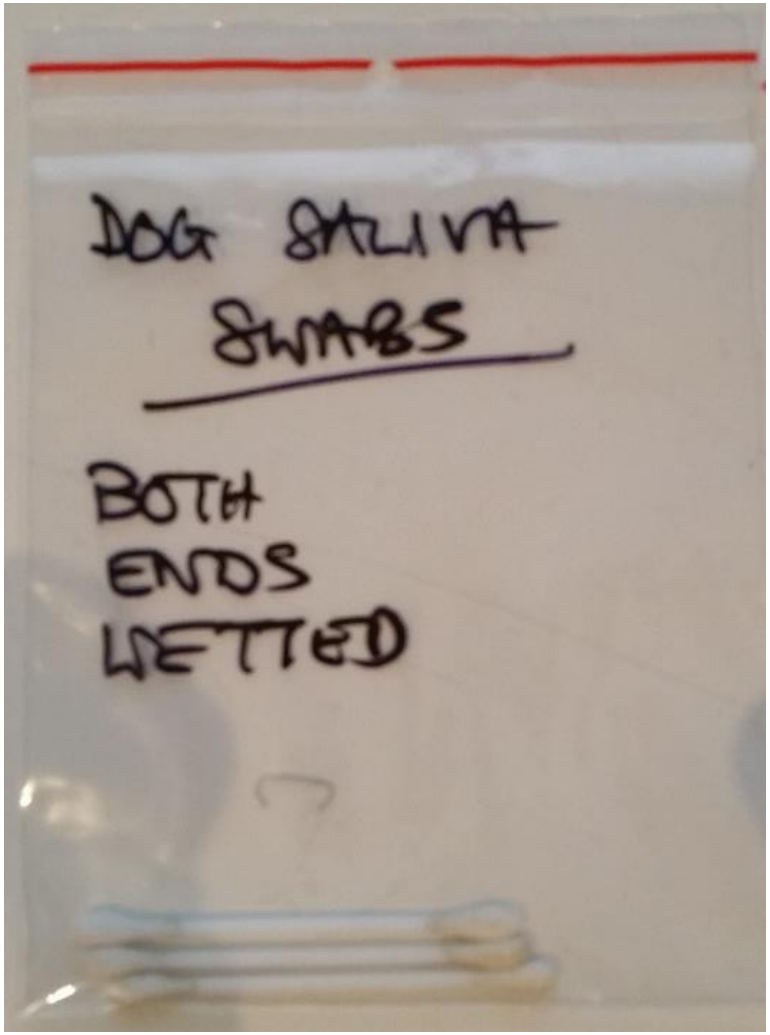
Find a cat that seems to have been set on fire? Owner thinks it's their cat.

Q: What can or can anything be done to help resolve this case?


H15022373


H15022373
4 HENS
KILLED
FEATHERS
FROM AROUND
BITE WOUNDS
+ SKIN
AROUND
TOOTH
HOLE


Sample Transportation
Tamper Evident Bag



SNP01										
SNP02 TT	SNP03 GA	SNP04 CC	SNP05 GG	SNP06	SNP07	SNP08	SNP09 GG	SNP10 AA	SNP11	
SNP12	SNP13	SNP14 GG	SNP15	SNP16 TT	SNP17 CC	SNP18 TT	SNP19 TT	SNP20	SNP21 CC	SNP22 CC
SNP23 AT	SNP24 AA	SNP25 AG	SNP26	SNP27 AA	SNP28	SNP29 AT	SNP30 GG	SNP31	SNP32 AA	SNP33 GG
SNP34 TC	SNP35 CC	SNP36 GA	SNP37	SNP38	SNP39 TT	SNP40 CT	SNP41 GG	SNP42 GG	SNP43	SNP44 GG
SNP45	SNP46 AG	SNP47 CC	SNP48	SNP49 CA	SNP50 GG	SNP51 GG	SNP52 CC	SNP53 GC	SNP54 TT	SNP55 GG
SNP56 CT	SNP57 CC	SNP58 GG	SNP59 TT	SNP60 TA	SNP61	SNP62 CC	SNP63 TC	SNP64 GG	SNP65 TT	SNP66 TT
SNP67 AA	SNP68	SNP69 TC	SNP70 TC	SNP71	SNP72 GA	SNP73	SNP74	SNP75 CC	SNP76 GT	SNP77
SNP78	SNP79 TT	SNP80 GG	SNP81 GG	SNP82 CC	SNP83 CT	SNP84	SNP85 TT	SNP86 CC	SNP87	SNP88

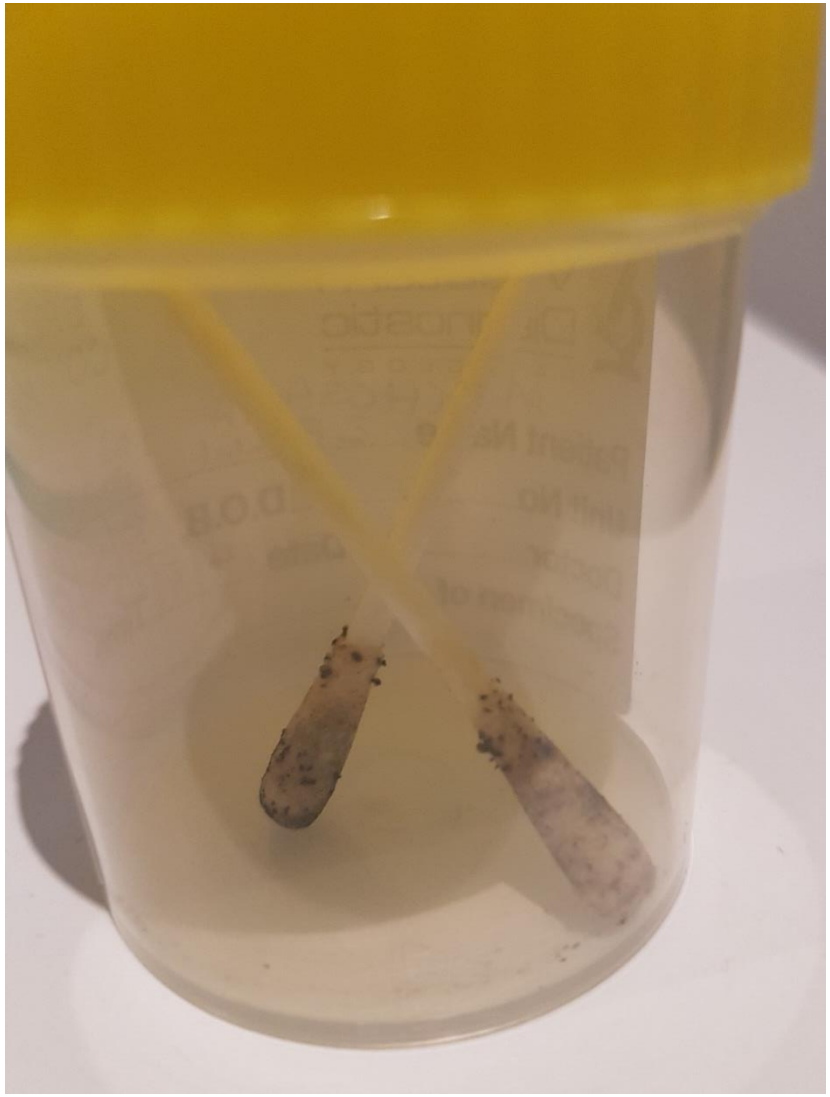
15-125368

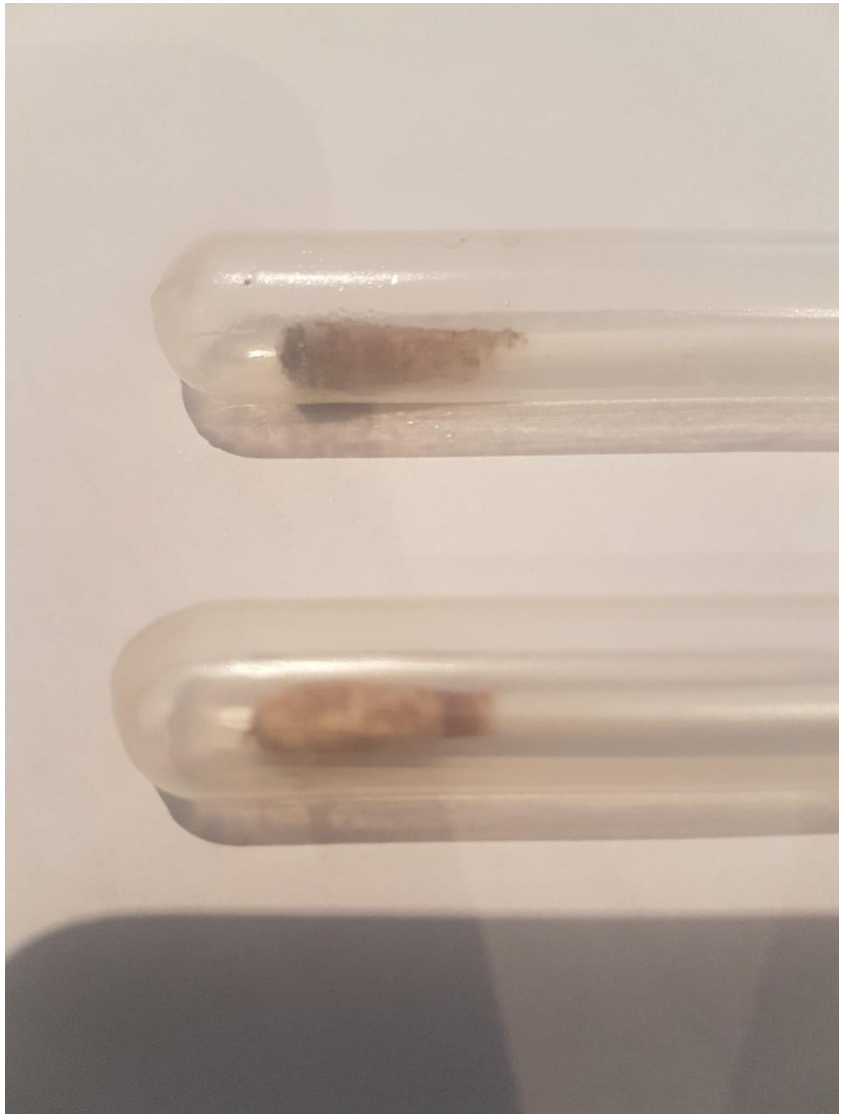
DNA PROFILE The DNA Profile below represents the genetic identification of Reference H15022373

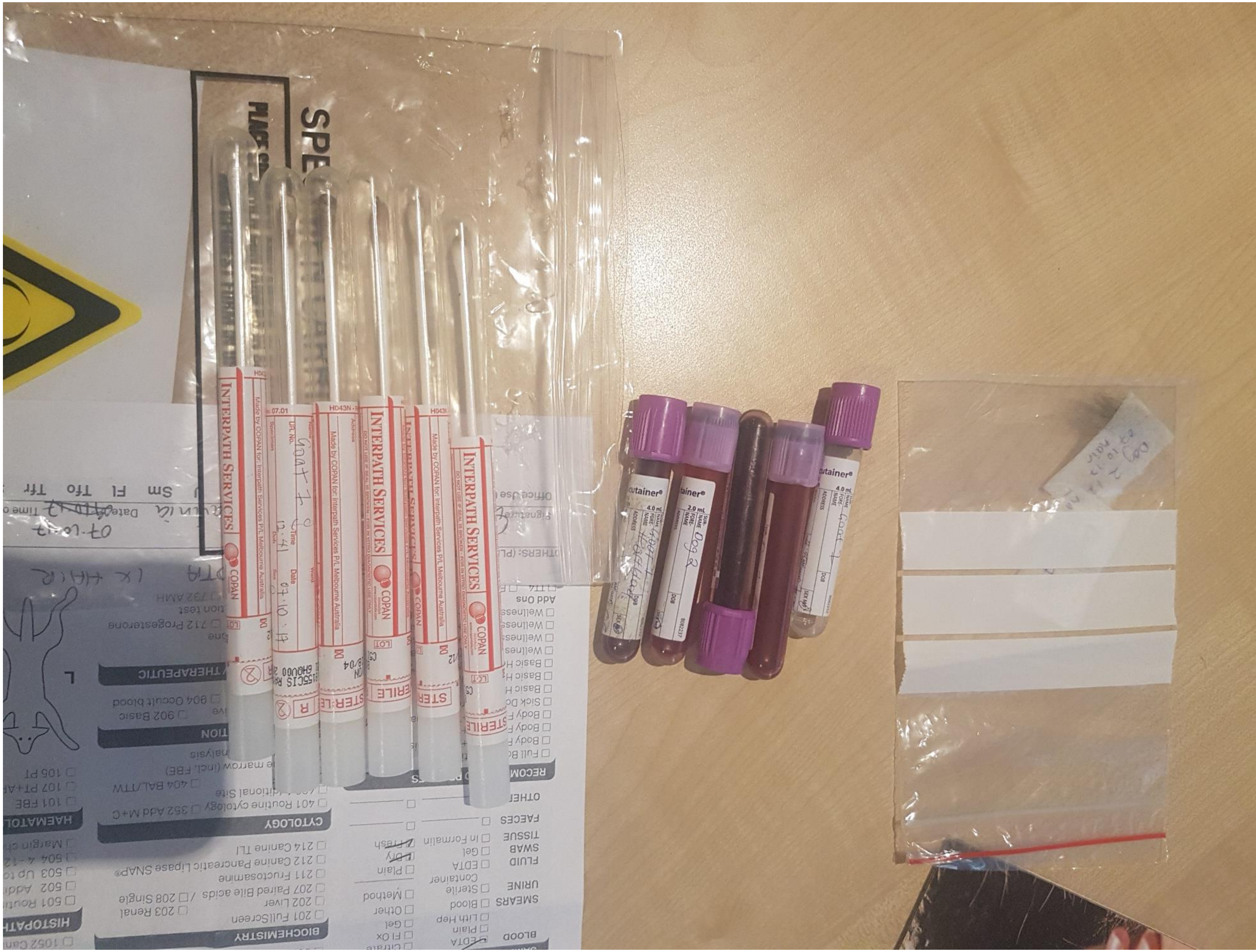
SNP01										
SNP02 TT	SNP03 GA	SNP04 CC	SNP05 GG	SNP06	SNP07	SNP08	SNP09 GG	SNP10 AA	SNP11	
SNP12	SNP13	SNP14 GG	SNP15	SNP16 TT	SNP17 CC	SNP18 TT	SNP19 TT	SNP20	SNP21 CC	SNP22 CC
SNP23 AT	SNP24 AA	SNP25 AG	SNP26	SNP27 AA	SNP28	SNP29 AT	SNP30 GG	SNP31	SNP32 AA	SNP33 GG
SNP34 TC	SNP35 CC	SNP36 GA	SNP37	SNP38	SNP39 TT	SNP40 CT	SNP41 GG	SNP42 GG	SNP43	SNP44 GG
SNP45	SNP46 AG	SNP47 CC	SNP48	SNP49 CA	SNP50 GG	SNP51 GG	SNP52 CC	SNP53 GC	SNP54 TT	SNP55 GG
SNP56 CT	SNP57 CC	SNP58 GG	SNP59 TT	SNP60 TA	SNP61	SNP62 CC	SNP63 TC	SNP64 GG	SNP65 TT	SNP66 TT
SNP67 AA	SNP68	SNP69 TC	SNP70 TC	SNP71	SNP72 GA	SNP73	SNP74	SNP75 CC	SNP76 GT	SNP77
SNP78	SNP79 TT	SNP80 GG	SNP81 GG	SNP82 CC	SNP83 CT	SNP84	SNP85 TT	SNP86 CC	SNP87	SNP88

15-125368

Two Examples of mouth Swabs – Reference Samples






INTERPATH SERVICES
COPAN
Made by COPAN for Interpath Services P/L Melbourne Australia
STERILE
Dog 2


GLAD

Analysis and Conclusion

The ***Examination Sample Barcode 17-136237*** had DNA extracted and analysed for canine DNA Profiling.
A partial DNA Profile was obtained from the sample submitted and collected by Dr Wong with a total of **58** Single Nucleotide Polymorphisms (SNPs) detected out of a possible 88 SNPs.
The ***Reference Sample Barcode 17-142041*** had DNA extracted and analysed for canine DNA Profiling. A complete DNA profile was obtained from the sample submitted by Dr Jacobs.
The veterinarian had requested a comparison of the ***Examination Sample Barcode 17-136237*** against the ***Reference Sample Barcode 17-142041***.
The examination sample showed a complete match of 60.35% to the reference sample (35 of the 58 SNPs matched the reference sample) – **60.35% of the DNA profile obtained from the examination sample was identical to the reference sample.**
The examination sample had a 29.31% (17 of the 58 SNPs) partial match to the reference sample – **29.31% of the DNA profile obtained from the examination sample had a partial match (50%) to the reference sample.**
The examination sample showed an exclusion (did not match) at 6 of the 58 SNPs (10.34%) – **10.34% of the DNA profile obtained from the examination sample had no match to the reference sample.**

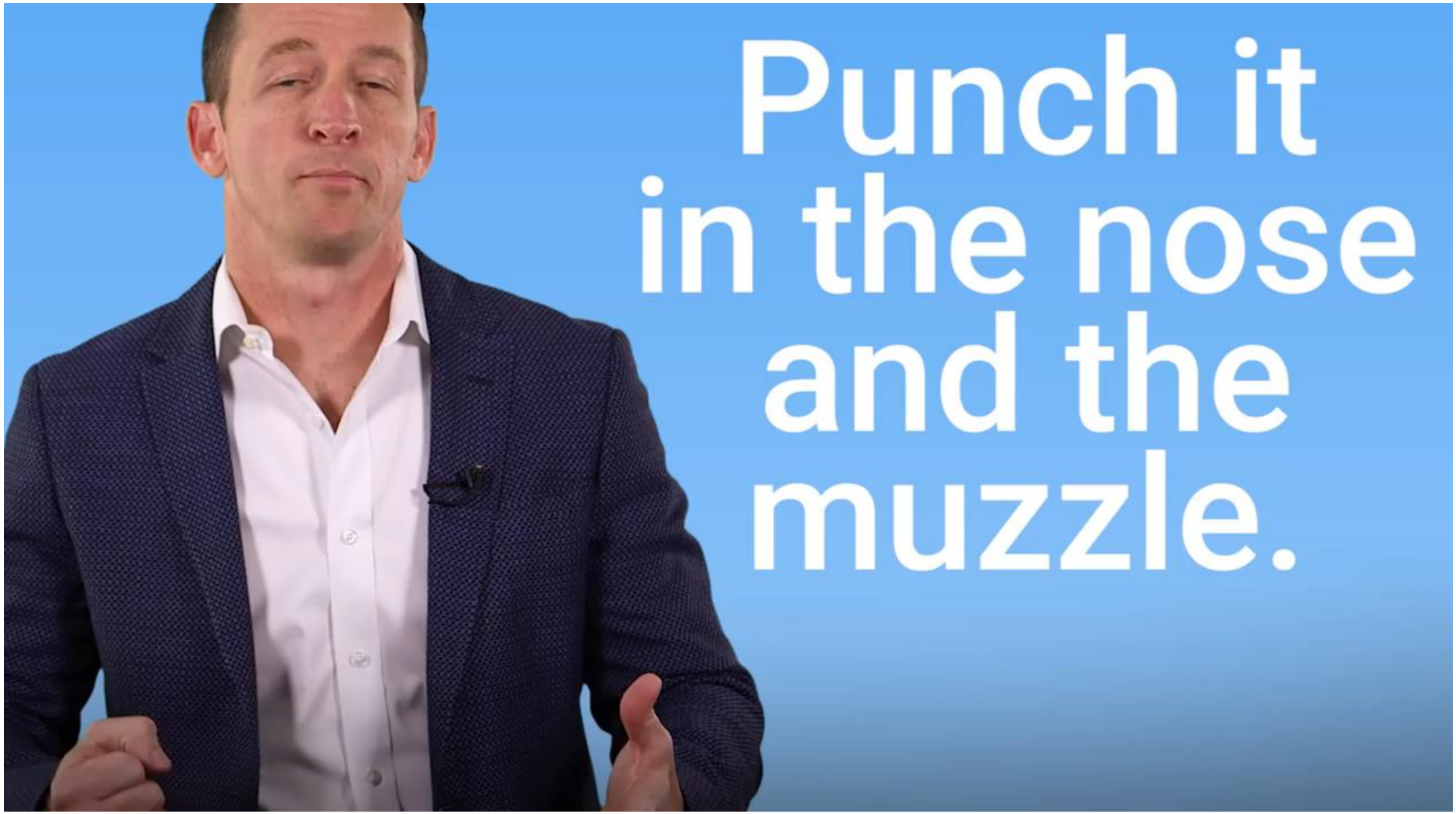
Please Note: Only one reference sample was provided, no reference sample of the "victim" canine was collected or submitted.

Summary of SNPs (Results)

Number of Exclusions (not matching)	**6 (10.34%)**
Number of Matching Sites	**35 (60.35%)**
Partial Match	**17 (29.31%**
TOTAL	**58**

Results Reviewed and Confirmed by
George Sofronidis
BSc (Hons)

What to do if you are attacked by a dog!



What Your Choice in PETS reveals about YOU (YOUR CLIENT) (Scientific American)

Dog Owners are more likely to:

Live with several family members

Senior management

Work as a professor/nurse/IT professional

Be extroverted & agreeable

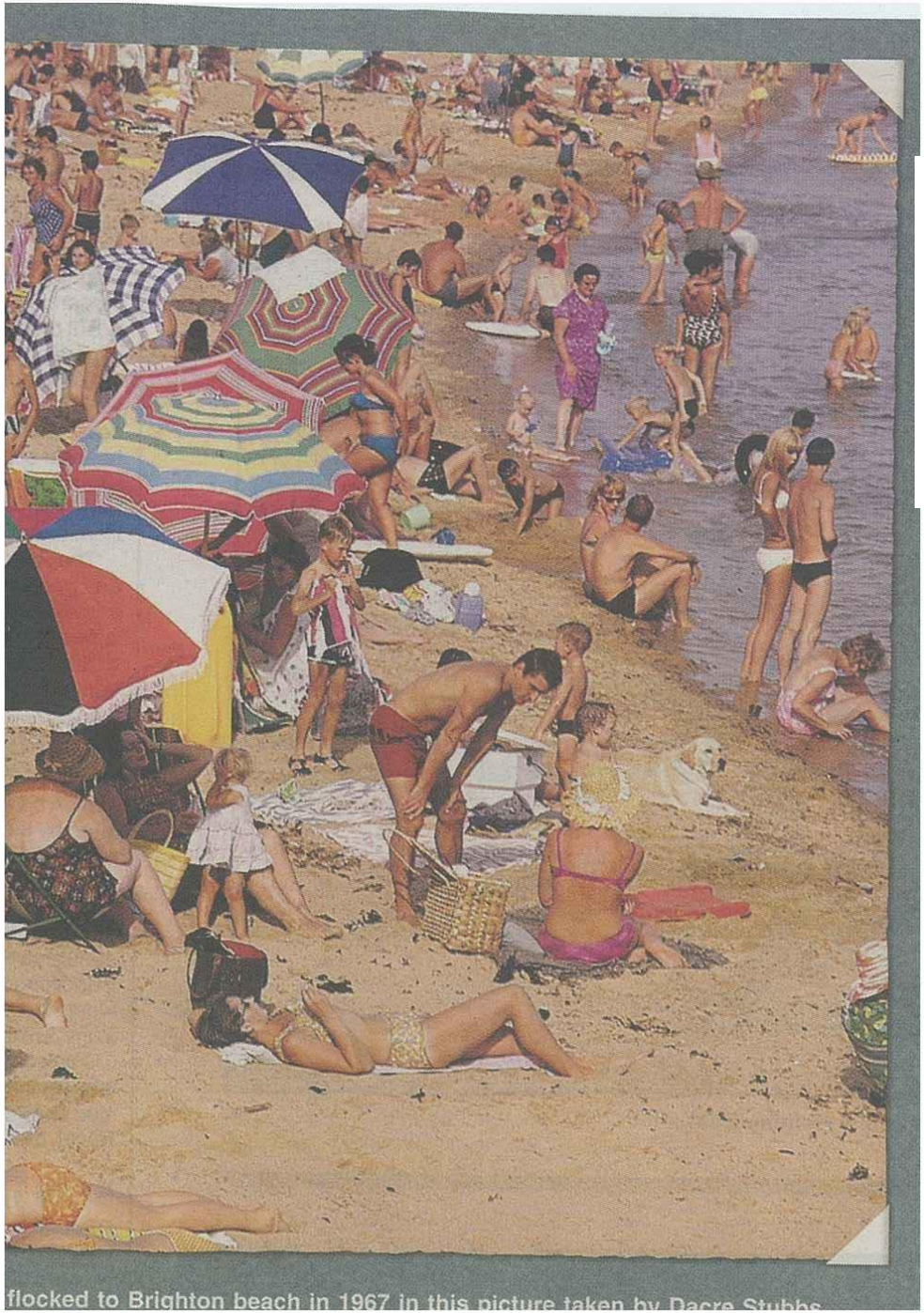
Cat Owners are more likely to be:

Divorced, widowed or separated

Be college educated

More intelligent

Less socially dominant


flocked to Brighton beach in 1967 in this picture taken by Dacre Stubbs

Whose off-leash dog beach is it, anyway? Answer: not your dog's

Neil McMahon

On Saturday night I went to the off-leash dog beach with my puppy for our regular twilight romp on the sand.

Typically here's what happens: Maudie, a seven-month-old English Staffy, runs and wrestles and plays with the rest of the Port Melbourne canines, whose owners assemble on the shore for the last wear-the-buggers-out dog walk of the day. Then we all go home.

Thank You

george@orivet.com